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**NEXT ANNUAL
MEETING**
JUNE 24, 25 and 26, 1908

MONTREAL, CAN.

ASSOCIATION
OF
Railway Telegraph Superintendents

PROCEEDINGS

OF THE

Annual Meeting Held at Atlantic City, N. J.

JUNE 19th, 20th and 21st, 1907

CONSTITUTION, BY-LAWS, LIST OF MEMBERS, ETC.

Press of
J. H. Yewdale & Sons Co., Milwaukee, Wis.
1907

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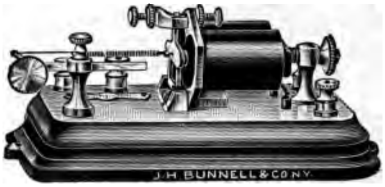
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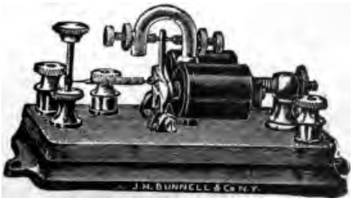
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OF

Railway Telegraph Superintendents

PROCEEDINGS

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1907

ANNOUNCEMENT

The Association was formed in Chicago, November 20, 1882 Its object is the improvement of the railway telegraph service.

The next annual meeting will be held at Montreal, Can., June 24th, 25th and 26th, 1908.

The undersigned will be glad to answer any inquiries in reference to the Association.

E. P. GRIFFITH, President,
Jersey City, N. J.

W. J. CAMP, Vice-President,
Montreal, Canada.

P. W. DREW, Sec'y and Treas.
Milwaukee, Wis.

Fair 5-10-47 EJK

THE ASSOCIATION

OF

Railway Telegraph Superintendents

CONSTITUTION AND BY-LAWS

PAST PRESIDENTS

W. K. Morley	1882
W. K. Morley	1883
C. Selden	1884
C. W. Hammond	1885
A. R. Swift	1886
Geo. L. Lang	1887
Geo. C. Kinsman	1888
C. A. Darlton	1889
G. T. Williams	1890
C. S. Jones	1891
L. H. Korty	1892
U. J. Fry	1893
O. C. Greene	1894
G. M. Dugan	1896
J. W. Lattig	1897
W. W. Ryder	1898
L. B. Foley	1899
W. F. Williams	1900
C. F. Annett	1901
J. H. Jacoby	1902
C. S. Rhoads	1903
H. C. Hope	1904
E. E .Torrey	1905
E. A. Chenery	1906

OFFICERS

1906-7

PRESIDENT.

E. P. Griffith	Erie Ry.	Jersey City, N. J.

VICE-PRESIDENT.

W. J. Camp	C. P. Ry.	Montreal, Can.

SECRETARY AND TREASURER.

P. W. Drew	W. C. Ry	Milwaukee, Wis.

COMMITTEES

ARRANGEMENTS.

W. J. Camp	C. P. Ry	Montreal, Can.
W. W. Ashald	G. T. Ry	Montreal, Can.
E. H. Millington	M. C. Ry	Detroit, Mich.
G. C. Kinsman	Wabash	Decatur, Ill.
M. Magiff	Cent. Vt	St. Albans, Vt.
S. A. D. Forristall	B. & M	Boston, Mass.
N. E. Smith	N. Y. N. H. & H.	New Haven, Conn.

LADIES' RECEPTION.

Mrs. W. J. Camp, Mrs. James Kent, Mrs. W. W. Ashald,
Mrs. Thos. Rodgers, Mrs. J. F. Richardson, Miss A. Jennings,
Miss Gladys Camp.

TOPICS.

J. L. Davis	C. & E. I. Ry.	Chicago, Ill.
E. Parsons	Ill. Cent. Ry.	Chicago, Ill.
Percy Hewett	Sunset Lines	Houston, Tex.

POLE CONSTRUCTION (To Withstand Sleet and Wind Storms).

William Maver, Jr., Electrical Engineer	New York.
C. H. Bristol, Gen'l. Supt. Construction, W. U. Tel. Co.	New York.
F. F. Fowle, A. T. & T. Co	Chicago.

LEGISLATION FOR WIRE CROSSINGS.

G. H. Groce, Ill. Central	Chicago.
G. C. Kinsman, Wabash	Decatur, Ill.
J. G. Jennings, C. R. I. & P. Ry	Chicago.

COMMITTEE TO FORMULATE METHOD AND CONFER WITH GENERAL MANAGERS' ASSOCIATION.

E. P. Griffith, W. W. Ryder, C .S. Rhoads,
G. H. Groce, C. Selden.

COMMITTEE ON MATTER OF RECORD.

H. C. Hope, J. L. Davis, G. A. Cellar.

SUB-COMMITTEES ON QUARTERLY MEETINGS.

Eastern.

C. Selden, L. B. Foley, A. B. Taylor.

Western.

E. A. Chenery, J. L. Davis. C. S. Rhoads.

LIST OF ACTIVE MEMBERS

Name.	Railroad.	Address.
E. P. Griffith	Erie	Jersey City, N. J.
E. A. Chenery	Missouri Pacific	St. Louis, Mo.
E. E. Torrey	M. & O.	Jackson, Tenn.
H. C. Hope	C. St. P. M. & O.	St. Paul, Minn.
C. S. Rhoads	C. C. C. & St. L.	Indianapolis, Ind.
W. F. Williams	S. A. L.	Portsmouth, Va.
L. B. Foley	D. L. & W.	New York, N. Y.
W. W. Ryder	C. B. & Q.	Chicago, Ill.
O. C. Greene	Northern Pacific	St. Paul, Minn.
U. J. Fry	C. M. & St. P.	Milwaukee, Wis.
L. H. Korty	Union Pacific	Omaha, Neb.
C. Selden	Baltimore & Ohio	Baltimore, Md.
G. C. Kinsman	Wabash	Decatur, Ill.
C. P. Adams	Southern	Washington, D. C.
G. H. Groce	Illinois Central	Chicago, Ill.
E. H. Millington	Michigan Central	Detroit, Mich.
H. C. Sprague	St. L. & S. F.	Springfield, Mo.
M. Magiff	Central Vermont	St. Albans, Vt.
A. B. Taylor	N. Y. C. & H. R.	New York.
F. G. Sherman	C. R. R. of N. J.	Jersey City, N. J.
S. K. Bullard	M. K. & T.	Sedalia, Mo.
P. W. Drew	Wisconsin Central	Milwaukee, Wis.
C. B. Phelps	L. & N.	Louisville, Ky.
C. H. Gaunt	A. T. & S. F.	Topeka, Kan.
W. A. Freese	C. & A.	Bloomington, Ill.
W. W. Ashald	G. T.	Montreal, Can.
Wm. Kline	L. S. & M. S.	Toledo, O.
E. A. Klippel	O. R. & N.	Portland, Ore.
V. T. Kissinger	B. & M. R.	Lincoln, Neb.
N. E. Smith	N. Y. N. H. & H.	New Haven, Conn.
F. L. Blendinger	L. V. Ry.	New York, N. Y.
G. W. Dailey	C. & N. W.	Chicago, Ill.
J. G. Jennings	C. R. I. & P.	Chicago, Ill.
S. A. D. Forristall	B. & M.	Boston, Mass.
J. B. Fisher	P. R. R.	Philadelphia, Pa.
W. S. Melton	Q. & C.	Chattanooga, Tenn.

Name.	Railroad.	Address.
B. F. Frobes	O. S. L.	Salt Lake City, Utah.
J. S. Stevens	C. & O.	Richmond, Va.
G. A. Cellar	Pa. Lines W. of Pitts.	Pittsburgh, Pa.
E. J. Little	Great Northern	St. Paul, Minn.
W. C. Walstrum	N. & W.	Roanoke, Va.
F. S. Spafard	C. R. I. & P.	Chicago, Ill.
J. P. Boyle	K. & W.	Centerville, Iowa.
W. P. McFarlane	F. E. & M. V.	Omaha, Neb.
L. S. Wells	L. I. R. R.	Long Is. City, N. Y.
G. B. McCoy	Y. & M. V.	Greenville, Mass.
H. A. Tuttle	M. St. P. & S. S.	Minneapolis, Minn.
F. A. C. Ferguson	Miss. Valley	Wilson, La.
W. L. Bisbee	H. & T. C.	Austin, Tex.
W. P. Cline	A. C. Line	Wilmington, N. C.
A. E. Roome	So. Pac	San Francisco, Cal.
R. L. Logan	K. C. So.	Kansas City, Mo.
C. M. Lewis	P. & R.	Reading, Pa.
J. M. Walker	D. & R. G.	Denver, Colo.
C. A. Parker	D. N. W. & P.	Denver, Colo.
J. L. Davis	C. & E. I.	Chicago, Ill.
J. L. Henritzy	C. & S.	Denver, Colo.
W. H. Potter	Southern	Washington, D. C.
Percy Hewett	Sunset Lines	Houston, Tex.
E. Parsons	Illinois Central	Chicago, Ill.
E. E McClintock	C. & W.	Denver, Colo.
W. J. Camp	C. P.	Montreal, Can.
E. W. Day	B. & O.	Baltimore, Md.
B. Weeks	Illinois Central	Memphis, Tenn.
J. C. Browne	St. L. I. M. & S.	Little Rock, Ark.
F. E. Bentley	T. R. R. Assn.	St. Louis, Mo.
J. L. Orbison	C. H. & D.	Cincinnati, O.
F. H. Van Etten	Sou. Ind.	Chicago, Ill.
C. L. Lathrop	P. S. & N.	Angelica, N. Y.
I. T. Dyer	S. P. L. A. & S. L. R. R.	Los Angeles, Cal.
A. S. Foote	Sunset Lines	Houston, Tex.
S. L. Van Akin	N. Y. Central	Syracuse, N. Y.
L. M. Jones	A. T. & S. F.	Topeka, Kas.
E. A. Patterson	C. M. & St. P.	Milwaukee, Wis.
G. A. Dornberg	Pa. Lines W. of Pitts.	Pittsburgh, Pa.

ASSOCIATE MEMBERS

A. P. Eckert	New York.
C. E. Brown	Chicago.
Henry W. Sperry	New York.
C. E. Yetman	New York.
Byron C. Eldred	New York.
E. W. Vogel	Chicago.
J. J. Ghegan	New York.
M. J. O'Leary	New York.
Howard E. Merrill	New York.
B. A. Kaiser	New York.
R. D. Brixie	New York.
F. F. Fowle	Chicago.
Jay G. Mitchell	Cleveland, O.
H. O. Rugh	Sandwich, Ill.
John Langan	New York.
H. P. Clausen	Chicago.
Alex. Henderson	Chelsea, Mass.
N. R. Fill	St. Louis, Mo.
W. B. Glardon	Denver, Colo.
Edwin R. Gill	New York.
J. C. Kelsey	Chicago.
Geo. M. Dodge	Valparaiso, Ind.
Harrison Osborn	New York.
Wm. H. Merrill	New York.
S. Johnson	New York.

HONORARY MEMBERS

Thos. A. Edison.
John B. Taylor.
T. D. Lockwood.
Ralph W. Pope.
J. C. Barclay.
J. B. Stewart.
A. J. Earling.
C. H. Bristol.
C. E. Freeman.
Wm. Maver, Jr.
Geo. C. Maynard.
W. K. Morley.
F. P. Valentine.
W. E. Gilmore.
H. V. Miller.
H. F. Houghton.
J. F. Wallick.
J. Levin.
J. R. Terhume.
James Kent.
G. F. Weidman.
J. H. Jacoby.
G. M. Dugan.
W. J. Holton.
R. C. Clowry.
W. C. Brown.
Geo. W. Stevens.
Marvin Hughitt.
W. M. Greene.
T. P. Cook.
F. S. Gannon.
Geo. T. Williams.
Belvidere Brooks.
I. N. Miller.
T. R. Taltavall.
J. W. Fortune.
W. J. Murphy.
C. D. Gorham.
Charles McLaughlin.
J. B. Taltavall.
E. A. Smith.
C. G. Sholes.
A. R. Swift.
E. Borden.
F. E. Clary.
C. A. Darlton.
C. F .Annett.
Geo. L. Lang.

ATTENDANCE

ACTIVE MEMBERS.

E. A. Chenery, wife and daughter, Mo. Pacific Ry., St. Louis, Mo.
E. P. Griffith, wife and daughter, Erie Railway, Jersey City, N. J.
W. F. Williams, wife and daughter, Seaboard Air Line Railway, Portsmouth, Va.
F. G. Sherman, wife and daughter, C. R. R. of N. J., Jersey City, N. J.
W. W. Ryder, and wife, C. B. & Q. Ry., Chicago, Ill.
C. P. Adams, wife and daughter, Southern Railway Company, Baltimore, Md.
A. B. Taylor, N. Y. C. & H., Grand Central Station, N. Y.
John L. Davis, wife and daughter, C. & E. I., Chicago, Ill.
P. W. Drew, and wife, W. C. Ry., Milwaukee, Wis.
W. P. Cline, and wife, Atlantic Coast Line, Wilmington, N. C.
W. C. Walstrum, Norfolk & Western, Roanoka, Va.
W. J. Camp, and wife, Can. Pacific, Montreal, Can.
V. T. Kissinger, and wife, C B. & Q., Lincoln, Neb.
W. S. Melton, C. N. O. & T. P. and A .G. S. R. R., Chattanooga, Tenn.
H. C. Hope, and daughter, C. St. P. M. & O., St. Paul, Minn.
C. S. Rhoads, and wife, C. C. C. & St. L. Lines, and N. Y. C. Lines, Indianapolis, Ind.
S. K. Bullard, and wife, M. K. & T., Sedalia, Mo.
C. S. Lathrop, and wife, P. S. & N., Angelica, N. Y.
J. S. Stevens, C. & O., Richmond, Va.
G. H. Groce, Ill. Central, Chicago, Ill.
G. A. Cellar, Pa. Lines west of Pittsburg. Pittsburg, Pa.
U. J. Fry, C. M. & St. P., Milwaukee, Wis.
J. B. Fisher, Penna. R. R., Philadelphia, Pa.
C. M. Lewis, P. & R., Reading, Pa.
E. Parsons. wife and daughter, Ill. Central, Chicago, Ill.
Percy Hewett, and wife. Sunset Route, Houston, Texas.
S. L. Van Akin, Jr., N. Y. C. & H. R. R., Syracuse, N. Y.
G. A. Dornberg. Penna. Lines, west, Chief Lineman, Pittsburg. Pa.
G. W. Dailey, C. & N. W., Chicago, Ill.

ASSOCIATE MEMBERS.

Sidney Johnson, Union S. & S. Co., New York.
J. C. Kelsey, Kellogg Switchboard & Supply Co., Chicago, Ill.
B. A. Kaiser, and wife, A. T. & T. Co., New York City.
Bryson E. Eldred, and wife, Duplex Metals Co., New York City.
E. N. Vogel, and wife, The Railway Supply Co., Chicago, Ill.
Edwin R. Gill, U. S. Electric Co., New York.
H. O. Rugh, Sandwich Electric Co., Sandwich, Ill.
A. P. Eckert, Safety Ins. Wire & Cable Co., New York.
Harrison Osborne, U. S. Electric Co., New York.
John J. Ghegan, J. H. Bunnell Co., New York.
Howard E. Morrell, U. S. Electric Co., New York.
John B. Taylor, General Electric Company, Schenectedy, N. Y.
J. G. Mitchell, North Electric Co., Cleveland, Ohio.
Henry M. Sperry, General Railway Signal Co., New York City.

HONORARY MEMBERS.

J. B. Taltavall, wife and daughter, Telegraph Age, 253 Broadway, New York.
C. F. Annett, W. U. T. Co., New Haven, Conn.
Thomas R. Taltavall, and wife, Electrical World, 114 Liberty St., New York.
William Maver, Jr., and wife, Electrical Engineer, New York City.

VISITORS.

C. M. Thompson, Kellogg Switchboard and Supply Co., Philadelphia.
P. W. Miller, Am. T. & T. Co., New York.
Cloyd Marshall, United Wireless Tel. Co., New York.
Val. B. Mintun, wife and daughter, M. & K. T. Co., Kansas City, Mo.
W. E. Harkness, Western Electric Co., Chicago, Ill.
Robert E. Chetwood, Jr., Am. T. & T. Co., New York.
W. F. Crowell, N. Y. Tel. Co., New York.
A. N. Bullens, N. E. T. & T. Co., Boston, Mass.
A. G. Francis, Chicago Telephone Co., Chicago, Ill.
M. O. Nevill, M. & Kan. Tel. Co., Kansas City, Mo.
G. S. Huntress, Jr., D. & H. T. & T. Co., Philadelphia.

CONSTITUTION

ARTICLE I.

Title.

The organization shall be known as "The Association of Railway Telegraph Superintendents."

ARTICLE II.

Object.

The object of this Association shall be: "The Improvement of the Telegraph Service," and the promotion and advancement in general of the interests of the telegraph department of railroads.

ARTICLE III.

Who May be Members.

Sec. 1. The membership of the Association shall be of three classes: Active, Associate and Honorary.

Sec. 2. Who may be Active Members:

Anyone connected in an official capacity with the telegraph, telephone, electric light, electric power, or electric signal department of any railroad, may become an Active Member of this Association, by subscribing to the Constitution and paying into the Treasury $5.00 per annum and receiving a majority vote of the members present.

Sec. 3. Who may be Associate Members:

Anyone connected with a telegraph or telephone supply house or publication may become an Associate Member, subject to receiving a majority vote of the members present and paying into the Treasury $5.00 per annum.

Associate Members shall be entitled to all the rights and privileges of Active Members, except that they shall not be allowed to vote.

Sec. 4. Who may be Honorary Members:

Men prominent in Railway Telegraph or Telephone circles, and those who have by furnishing papers and otherwise contributed to the success of the Association, and any Active Member, who is in good standing as to payment of dues, leaving the service of railroad companies or of the departments mentioned in Sec. 2, may become an Honorary Member upon receiving a majority vote of members present. Honorary members shall be entitled to all the rights and privileges of Active Members except that they shall not be allowed to vote.

ARTICLE IV.

Officers.

The officers of this Association shall be elected by ballot, and shall hold office for one year, or until their successors are chosen. They shall consist of a President, Vice-President, Secretary and Treasurer; the last two offices may be filled by one person. The officers of this Association shall constitute an Executive Committee.

ARTICLE V.

Duties of Officers.

President—The President shall preside at all meetings of the Association, and perform such other duties as are generally performed by that officer.

Vice-President—The Vice-President shall preside in the absence of the President, and when so acting shall be governed by the rules prescribed for that officer.

Secretary—The Secretary shall keep correct minutes of each meeting, and cause the same to be printed immediately after adjournment, and send to each member two copies of the same. He shall also notify the members, by circular, of the time and place of each meeting, and perform such other duties as may be required by the Executive Committee.

Treasurer—The Treasurer shall collect all moneys due the Association, giving his receipt therefor, pay all bills contracted for by it, upon the approval of the Executive Committee, and at each annual meeting render a detailed statement of the receipts and expenditures of the previous year, which statement shall be printed with the proceedings of the meeting at which it is presented. In order to meet expenses in excess of the receipts from annual dues, he shall levy a pro rata assessment upon the members of this Association.

ARTICLE VI.

Vacancies.

In case of a vacancy in any office, it shall be filled for the remainder of the year by the Executive Committee.

ARTICLE VII.

Seven members shall constitute a quorum at any meeting.

Amendments to the Constitution.

This constitution shall be changed only by an amendment offered in writing at a regular meeting, one month's notice having been given to each member by the Executive Committee, and can only be adopted by an affirmative vote of two-thirds of the members present.

BY-LAWS

1. The Executive Committee is authorized to declare applicants acting members previous to the annual meeting.

2. The annual meeting of this Association shall be held at such time and place as shall be designated by the majority vote of members at a previous meeting.

3. Special meeting may be held upon the call of the Executive Committee, when requested by seven or more members.

4. Any member who is in arrears in payment of dues ninety days after the annual meeting shall be considered suspended, and should dues not be paid on or before the succeeding annual meeting, his name shall be dropped from the roll of membership.

At all meetings the following shall be the order of business:

1. Election of New Members.
2. Reading the Minutes of Regular and Special Meetings.
3. Report of Treasurer.
4. Reports of Standing Committees.
5. Reports of Special Committees.
6. Election of Officers.
7. Miscellaneous Business.
8. Adjournment.

Minutes of the Proceedings of the Twenty-sixth Annual Convention, Association of Railway Telegraph Superintendents, held at Atlantic City, N. J., June 19th, 20th and 21st, 1907.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.

Twenty-Sixth Annual Convention.

ATLANTIC CITY, N. J.,
June 19, 20 and 21, 1907.

The Twenty-sixth Annual Convention of the Association of Railway Telegraph Superintendents was held at the Marlborough-Blenheim Hotel, Atlantic City, N. J., June 19, 20 and 21, 1907.

FIRST DAY—MORNING SESSION.

(Wednesday, June 19, 1907.)

The convention was called to order by President E. A. Chenery, M. P. Ry., St. Louis, Mo., at 10:30 o'clock A. M.

President Chenery: Ladies and Gentlemen: At former meetings it has been customary for the Mayor or representative of the municipality in which the meetings have been held, to deliver an address of welcome, but because of the many interesting papers to be presented at this session, which will consume all of the time we can devote to them in the two days we are to be here, it was decided to cut out the feature of a formal address of welcome and the customary response. For that, I, perhaps, owe you an apology. Before we came into this room the matter was brought up as to who was to address the meeting, and I stated it was my understanding that no provision had been made. I was asked what under the sun we wanted the ladies to come for. "Well," I said, "if for nothing more, to give me an opportunity to look at them, and derive the inspiration I certainly will have in looking at their faces."

I assure you that it is gratifying to your officers to see such an intelligent and good-looking gathering as we have at this twenty-sixth annual convention of this association. I am sure that the papers to be read will be interesting and will receive such discussion as they deserve by the members present, who have been furnished with a list of the topics.

That the ladies will be taken care of there is not a shadow of doubt. I do not know whether the fishing and bathing is very good this morning, but they tell me sights can be seen from the boardwalk, which ordinarily to us inland people can only be observed from shop windows or standing on the street corners vis-a-vis. I am reminded of Shakespeare: "The apparel oft proclaims the man." It won't be necessary to devote very much time in attempting to seek out the man.

I will say that this association was formed for the purpose of improving the telegraph service, as you all know. That it has come up to expectations I do not think any member present will question. We aim, each year, to have interesting papers and to discuss matters of benefit to the roads we represent, and there is no question, even though the papers may not have been as numerous as they are at this meeting, but what a good deal of benefit has been derived by the members of the association. Frequently we have occasion to take up matters with our neighbors to know of their methods about maintenance, etc., and when in cold-blooded type, you might say, you don't always get the results. Therefore, the getting together personally is certainly of great benefit. I say that particularly to the members of the association, at least the active members. The associate members who meet with us are always willing and always do give us a great deal of their time and provide exhibits for our entertainment, which certainly are of much interest and benefit.

At this meeting there is to be a report from the committee on "uniformity of superintendents' duties," and a paper to be presented, entitled: "The superintendent of telegraph; what he is versus what he is not." Whether these two subjects will solve the question, there is no question but what the superintendent of telegraph is a handy man to have in the official family. He is consulted not only on the method of moving messages over the wires, but is brought into other matters of transportation interest.

I shall not take up your time longer with a speech. As my friends know, I cannot talk very well unless they corner me. You have found that out occasionally. Besides, the president of the convention, as I understand, is presumed to curb any unnecessary talk.

Before adjourning for a period of five minutes, as is customary, to permit the ladies to become better acquainted with each other, or to make up their minds whether they wish to stay with us and participate in the discussions or go on the boardwalk, we would like to hear from the entertainment committee. I do not know that any special feature has been provided for the ladies, but we would like to hear from the chairman, Mr. Selden.

Mr. Selden: When our committee had its meeting here we found there was no place to which we could make an excursion. New York is nearby and so is Philadelphia, but so far as Atlantic City is concerned we felt that the members could find their own pleasure. So far as a welcome to this city is concerned, we felt we were welcome.

President Chenery: Just before we opened our exercises—I was going to say services—a photographer stated he would like, if possible, to have the "bunch" assemble and have their picture taken. While we gave him no particular encouragement, I thought, perhaps, we might meet here at 2 o'clock, say, and then if we so conclude, our picture can be taken, and such members as would like to take one home will be given that opportunity.

Secretary Drew: I want to bring to your attention the very important matter of having the attendance cards filled out. Any who have not received cards can get them here, and those who have will please send them to the Secretary's desk. This is a very important feature, because if any of the names are missed of those here, of course, our minutes do not show they are present. We had at one time occasion to verify the attendance of one of the members who told his wife that he had gone to the association meeting. Unfortunately he did not fill out a card and I had to personally prove that he was present. (Laughter.)

President Chenery: Unless I hear some objections we will take a recess for five minutes in order to permit the members to give their excuses to their wives and sweethearts as to their conduct on the boardwalk.

(RECESS.)

Upon re-convening—

President Chenery: The first order of business, according to the by-laws, is the election of new members. We will hear from the Secretary.

Secretary Drew: Gentlemen, we have the following, who desire membership in our association:

ACTIVE.

J. L. Henritzy, C. & S. Ry	Denver, Col.
L. M. Jones, Asst. Supt. Tel. A. T. & S. F	Topeka, Kas.
S. L. Van Akin, Jr., Asst. Supt. Tel. N. Y. Cen	Syracuse, N. Y.
W. S. Melton, Supt. Tel. Q. & C	Chattanooga, Tenn.
G. A. Dornberg, Chief Lineman P. Lines W. of P	Pittsburgh, Pa.
J. B. Fisher, Supt. Tel. Pa. R. R	Philadelphia, Pa.
E. A. Patterson, Asst. Supt Tel. C. M. & St. P	Milwaukee, Wis.

ASSOCIATE.

Byron C. Eldred, Sec. & Tr. Duplex Metal Co.	208 5th Av., New York.
John Langan, Okonite Co	253 Broadway, New York.
Howard E. Merrill, U. S. Elec. Co	New York.
Harrison Osborn, U. S. Elec. Co	New York.
Wm. H. Merrill, U. S. Elec. Co	New York.
Jay G. Mitchell, No. Elec. Co	Cleveland, O.
R. D. Brixey, Kerite Cable Co	203 Broadway, New York.
S. Johnson, Union Sw. & Sig. Co	143 Liberty St., New York.
H. M. Sperry, Res. Mgr. Genl. Ry. Sig. Co	525 5th Av., New York.
Geo. M. Dodge	Valparaiso, Ind.

HONORARY.

Geo. L. Lang	Chattanooga, Tenn.
W. J. Holton	Chicago, Ill.
John B. Taylor, Genl. Elec. Co	Schenectady, N. Y.

Mr. Selden moved that the Secretary cast the ballot electing the applicants,

And agreed to.

Which was duly seconded,

Secretary Drew: I have an announcement to make of the death of J. H. Reid, associate member, of Philadelphia. Mr. Reid never attended any of our meetings, but he joined as an associate member and was a member for a year. I received a letter from his wife, when I sent him a copy of last year's minutes, advising me of his death.

Also, our old friend and former member, Kenneth Makenzie, who passed away about the time of our meeting at Denver, but we did not receive notice in time to get it in our last year's minutes. We wish to record him, also, as one of our members who has passed away. No action, however, is necessary in these cases.

President Chenery: Next in order is the reading of the minutes of the regular and special meetings. Inasmuch as the minutes of the last regular meeting have been published and distributed, it would be in order for a motion to prevail to dispense with the reading of the minutes and that they be approved as printed.

Mr. Hope moved the reading of the minutes be dispensed with and that they be approved as printed,

Which was duly seconded,

And agreed to.

President Chenery: I will say in connection with the special meeting, it may not be out of place to mention the fact that some of the western members this past winter thought it advisable to get together on some certain matters that were confronting them, and meetings were held in Chicago and St. Louis nearly every month. While we did not attempt a complete record of the transactions, I believe it has been recognized by all those in attendance that such meetings were beneficial. It occurs to me it might not be a bad idea—perhaps, every quarter, if you please, to get together in the west, and, perhaps, also, in the east, and exchange ideas as to certain matters that might come up. One of the advantages of those meetings was that we were able to put out feelers as to matters to be discussed before this convention. I think we accomplished something. Our able chairman of the Executive Committee certainly worked hard. I merely make this as a report as to what those special meetings did.

Secretary Drew: In connection with that feature, I would like to offer now this circular, which was distributed to all the members of the association, but which originated in those sub-meetings at Chicago and St. Louis. The President and myself took it upon ourselves, as a majority of the Executive Committee, to authorize the printing of this, and, in order to clear our record and make the thing legitimate I would suggest that some one make a motion that this association approve the action of the Executive Committee in having this circular printed, a circular which, as you probably are aware—perhaps some of you are not, but most of you are—was in regard to wire crossings over railroads, to try to get as far as possible a uniform state law to protect us, as railroad men, from the great injury we are receiving from inefficient wire crossings that are being put over our railroads almost every half mile, and this was the result. We received quite a little benefit, as several of the states did pass a law as we suggested, with some variations, of course, in accordance with the local conditions. I would suggest that this matter be approved, so it can go on our record.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.
Secretary's Office.
Care Wisconsin Central Railway.
Milwaukee, Wis., Dec. 24, 1906.

To the Members:
Association of Railway Telegraph Superintendents.

Gentlemen: The necessity for legislation regulating wire crossings has long been apparent to this Association and made the subject of considerable discussion at our annual conventions.

As a protection to trainmen as well as to guard against interference to the railway telegraph wires, there should be uniform laws in the several States to enforce safe construction and proper maintenance of wires crossing our railroad tracks.

At a meeting held in Chicago on Tuesday, December 18th, 1906, the matter was thoroughly discussed and the following motion made by Mr. Ryder, seconded by Mr. Dailey, unanimously carried:

"That it is the sense of the Association of Railway Telegraph Superintendents that a law should be passed in all States, not now having such statute, to provide greater protection to the lives of trainmen and to minimize interference with railway wires.

"Be it therefore resolved, that an amended copy of the Michigan Law No. 171, with the reference to grade track crossings eliminated and an addition of the wording of the Wyoming Law 'Protection to Trainmen,' be referred to the Law Department of the various railroads with recommendation that an effort be made to secure the passage of a similar law in the various States through which our roads operate."

Below is an amended form of the Michigan Law suggested:

PROTECTION OF TRAINMEN.

AN ACT for the protection of trainmen and to regulate the stringing of wires, electric or other, over railroad tracks, and relative to the maintenance of such wires heretofore so strung.

SEC. 1. The people of the State of .... enact, That it shall hereafter be unlawful for any corporation or person to string any wire, electric or other, over the tracks of any railroad company, except at such places and in such manner as shall be approved by the Railway Commission (or other proper authority) and any corporation or person desiring to so string any wire shall give the railroad company notice in writing of the place where and the manner in which it desires to string the same, and the place where and the time when it will apply to the Railway Commission (or other proper authority) for approval as above required, which notice shall be served at least ten days before the time of hearing of such application.

SEC. 2. Said Railway Commission (or other authority) shall also, as soon as possible after the passage of this act, either by personal examination or otherwise, obtain information as to all places where the tracks of railroad are crossed by wires strung over said tracks and wherever in its judgment, such wires should be raised to a greater height or other thing done with reference thereto, to guard against accidents, shall order such change or changes to be made, and shall apportion any expense incident thereto between the companies or persons affected as may be deemed just and reasonable, PROVIDED, That in no case shall the height of any wire strung across such railroad tracks be less than twenty-five feet, excepting trolley wires, which shall not be less than twenty-two feet from the top of rail of said railroad tracks.

SEC. 3. It shall be the duty of every corporation and persons to whom an order made by the Railway Commission (or other proper authority) under this act shall be directed, to comply with such order in accordance with its terms, and for any neglect to so comply therewith, any such corporation or person shall be liable to a penalty of one hundred dollars and to a like penalty for every ten days during which said neglect shall continue. Any such penalty may be recovered in an action of assumpsit brought in the name of the people of this State, and it shall be the duty of the prosecuting attorney of the proper county to bring any such action at the request of the Railway Commission (or other proper authority).

The action taken has been favorably passed upon by the Executive Committee of this Association and the matter is now respectfully submitted, suggesting that each member through his legal department, endeavor to secure the passage of a law at the present or coming session of the legislature of the State in which he is affected, in accordance with the above resolutions.

Yours truly,

Approved:
P. W. DREW,
Secretary.

E. A. CHENERY,
President.

Mr. Selden moved that the action of the Executive Committee be approved,

Which was duly seconded,

And agreed to.

Mr. Camp: Can the circular be embodied in the minutes of this year?

Secretary Drew: Yes, sir.

Mr. Ryder: I would like to ask what States did pass it.

President Chenery: Wyoming was one of the States.

Mr. Selden: I have received invitations to attend these meetings, but it has been impossible for me to do so, much

EXPENDITURES.

Minutes—Stenographer, Printing, Etchings and Postage	$248.50
Printing Circulars and Attendance Cards	12.75
Printing Stamped Envelopes	11.75
Stenographic Work	2.00
Badges	23.25
Expressage	1.25
Secretary's salary	300.00
Cash on hand	93.00
Total	$692.50

Mr. Selden moved the report be accepted,

Which was duly seconded,

And agreed to.

REPORT OF COMMITTEE ON TOPICS.

Mr. A. B. Taylor, chairman, presented the following report:

List of Papers to be Read at Annual Meeting of Association of Railway Telegraph Superintendents, to be Held at Atlantic City, June 19 and 20th, 1907.

By H. C. Hope, C. St. P. M & O. R. R.—Education of Telegraphers in Railroad Work.

By F. E. Bentley, Terminal Railway Ass'n, St. Louis—The Superintendent of Telegraph; What He is Versus What He is Not.

By S. L. Van Akin, Jr., New York Central & Hudson River R. R.—Maintenance and Operation of Telephone Service on Railroad Company's Lines.

By R. L. Logan, Kansas City Southern Error Sheets.

By G. W. Dailey, Chicago & Northwestern R. R.—Opportunities in the Telegraph Service.

By G. A. Cellar, Pennsylvania Lines—Experiments with Concrete Poles.

associations meet twice a year and their last meeting is held a short time prior to the annual meeting, so that any topics that are brought up by them are referred to the general meeting for action. These smaller associations do not do anything except suggest and recommend. They take no formal action. That is left with the general association, which meets every May. I think, as Mr. Selden has said, owing to the great distance some of us have to travel, it is certainly a very wise plan, and I would suggest that it would not be out of place for a committee of three or five to be appointed right here and now to formulate some plan or suggest something that could be brought before us later in the meeting for action.

President Chenery: We have a number of important papers to be read to-day, but I know of no subject that is more worthy of consideration than this matter that is now before you. I will be very glad to hear a motion made.

Mr. Camp moved that a committee, as suggested by the Secretary, be appointed, to arrange a plan and bring it before the meeting to-morrow,

Which was duly seconded,

And agreed to.

TREASURER'S REPORT.

Secretary Drew presented the following:

RECEIPTS.

Cash on hand ....
Dues ....
Advertisements ....
Minutes sold ....

Total ....

Secretary Drew: There was one gentleman who spoke to me this morning, who wanted to have his paper read early in the meeting as he expected to be obliged to go away.

President Chenery: Mr. Taylor.

Secretary Drew: Wouldn't it be well to have Mr. Taylor read his paper right now, and, if he is obliged to go away he will be at liberty to go, but we will have the benefit of his presence while his paper is being discussed.

President Chenery: Before that is acted upon I want to say that, perhaps, we of the southwest are more interested in this paper than certain other members. I am particularly anxious to get as many members present during the reading of the paper as possible. I talked with Mr. Taylor this morning and feel satisfied it will be agreeable to him to defer the reading of his paper until this afternoon at least, or possibly to-morrow morning. Therefore, unless Mr. Taylor wishes to change that I will put it off.

Mr. Taylor: It would be satisfactory to-morrow afternoon or even to-morrow evening.

President Chenery: The first paper on the list, and deservedly so, is one by H. C. Hope, entitled "Education of Telegraphers in Railroad Work." It seems to me it would be well to have that paper first, and I therefore call upon Mr. Hope.

Mr. Hope read the following paper:

EDUCATION OF TELEGRAPHERS IN RAILROAD WORK.

By Henry C. Hope, of St. Paul Minn.
Superintendent of Telegraph and Signals, Chicago, St. Paul, Minneapolis, and Omaha Railway Company.

All telegraphers are employed, examined and instructed in the office of the superintendent of telegraph and signals of the Chicago, St. Paul, Minneapolis and Omaha Railway Company, and a rigid written and oral examination is required before any are allowed to enter the service.

Upon receiving inquiry for employment, and the applicant giving signs of having a suitable education, with stability, intelligence and experince, he is sent an application blank showing the requirements, and same, when returned properly filled out, is filed for future reference. A vacancy occurring, the applications are inspected and the most promising man selected.

Upon arrival of the applicant at headquarters, he is taken in charge by the chief operator and examined as to his ability as a telegrapher. Due allowance is made for natural nervousness of the candidate under examination and every opportunity is afforded him to show what he can do. To meet the standard he has to copy three train orders in succession of different phraseology. They must be of legible penmanship and correct without a scratch or fumble, interlineation or alteration, at a rate of speed from twenty-three to thirty words per minute, averaging five letters per word, and he must correctly transmit and repeat back the same at same average speed. Otherwise he is rejected. Sometimes several applicants in a day are rejected. After passing examination in telegraphy, his letters of recommendation or service cards from previous employers are called for and a copy of same made. They must show a clear record for the previous five years. His credentials are returned to him. If he has no credentials, he is required to wait until his previous employers are communicated with by wire and his record established. Letters of recommendation are verified by mail or wire to insure their being genuine.

The applicant is required to fill out three application blanks, one for the superintendent of telegraph and signals, one for the general superintendent and one for the claim agent. These blanks have a printed form on reverse side for the chief operator's report of examination, that is, proficiency in telegraphy and standard on sight, hearing and colors.

To pass a normal physical examination, an applicant must be able to read with each eye separately printed letters one-half inch long, composed of lines an eighth of an inch wide on a chart at a distance of twenty-four feet. He must hear the tick of a watch with each ear separately at a distance of thirty-six inches. Where the ratchet acoumeter is used the examinee must call off the clicks numerically as they are produced by the examiner, first slowly, then rapidly, first in regular time singly, then by twos and three with a pause between each two groups of clicks at the required distance. He must group in each class to which they belong five different shades of the following colors (using the Thompson Yarns): red, green, blue, yellow, pink, brown and white. The Williams lantern is also used in making an examination on colors. The examinee, at a distance of twenty feet, must call off the names of the different colors as they are given by flash light in rapid succession at the option of the examiner. The lenses vary in diameter, the largest representing switch lights at a distance of 150 feet, the next 600 feet and the smallest 1,300 feet.

It is found that ten per cent. of the applicants are disqualified by reason of defective eyesight, three per cent.

by defective hearing, and six per cent. by defective color perception.

If the applicant's record is found to be acceptable, a book of rules is given him to study, and afterwards a pamphlet entitled "Operators' Examination," in which he must answer upwards of two hundred questions in writing bearing on the duties of a telegrapher. These answers are checked over and the writer advised of any that are wrong, which he must correct. This is termed his second examination.

After this is done, he is subjected to a third examination which is oral, lasting from four to six hours, on rules considered essential to safety of passengers and trains.

All station helpers and apprentice telegraphers from points along the system who have not previously been present on a similar occasion are brought to headquarters to listen to this oral examination. They hear the important rules explained, the questions, the answers, the comments, the important troubles which telegraphers have had on the road and throughout the country during the last fifteen years, the cause and remedy, and the general instructions which have been issued to guard against these troubles are related to them. No applicant, however, is assigned to duty as a telegrapher until, in addition to the foregoing, he has himself passed a satisfactory written and oral examination. The examination of the other man is for him simply a preparation. In this way he goes to work not as a green hand, but as one who has had fifteen years of experience.

After passing examination on rules, he is seated at the telegraph examination table, furnished with train order signal, train order manifold, carbon sheets and stylus, and required to receive orders in regular form in accordance with the rules on which he has just passed examination, displaying his train order signal, giving the proper responses, repeating the orders, etc., and drilled in this way until he can handle the orders rapidly and correctly and without any prompting. This done, he is ready for duty. If he is to be an agent, or perform clerical work, or fill high position as a telegrapher, he is sent to the division superintendent for inspection that the latter may know him before he goes to work. Otherwise he is sent direct to the agent at the station at which he is to serve.

No one under twenty-one years of age is made an agent, and none are appointed telegraphers under eighteen years of age. If the position is one requiring bond, notice is immediately sent to the comptroller. In case of appointment to an important position as ticket agent or ticket seller, the approval of the general passenger agent is also obtained. Promotion to the position of agent is made from the ranks of telegraphers; when possible, competency being equal, preference is given to seniority of service. Train despatchers are generally made by promoting telegraphers in train despatcher's office. Candidates for telegraphers in despatcher's office are selected from the best material on the division.

When an agent is desired for one of the larger stations the traffic department is conferred with.

In addition to the personal record blank, a service record is kept of every one connected with the telegraph and signal department from apprentice up, showing date of appointment, capacity, station, term of service, promotions, suspensions, errors, dismissals, etc. A telegrapher leaving the service for any cause is given a service letter addressed to himself, stating the time and character of service and specifying the reason for leaving.

It takes from one to three days for a telegrapher to complete his examination. One day is sufficient for an experienced, energetic man. The average man consumes three days as follows:

First Day.—Three separate application blanks covering history for the last five years to be filled out. Examination on sight, hearing and colors. Examination as to telegraph proficiency. Learning the rules of the company as set forth in their rule book and special instructions.

Second Day.—Written examination, 198 questions to be answered in writing, answers to be read and corrected by examiner and a second written examination made of corrected answers.

Third Day.—Oral examination on rules, verbal instructions on the cause and prevention of railway accidents and drilling on the proper manner of handling train orders by telegraph, copying train orders on manifold, repeating them, displaying signals, etc.

It has been our experience that a man who has reached the age of eighteen, after having passed the required examination, is fully qualified to handle train orders. In proportion to the number of men employed over twenty-one, as against the same number between eighteen and twenty-one, the men over twenty-one are in the majority of those who have caused trouble in the operation of train movements.

The discipline of telegraphers is accomplished through the telegraph and signal department and the division officers. It is the duty of the traveling telegrapher to observe how all matters pertaining to the telegraph and signal service are being conducted, to see that all signal lamps and lenses are cared for in a way to obtain the best results, that blocking between adjoining stations by signalmen, keeping of block records, handling of train orders and block cards and operation of block signals is properly done, correcting and instructing those who need it and making regular and systematic inspection reports to headquarters covering each office within his district. It usually takes three days for operators coming from other railroads having similar rules to ours to qualify and get acquainted with our methods, requirements, etc.

Each agent, telegrapher, and apprentice telegrapher is furnished with a pamphlet entitled, "The Monitor," containg one hundred questions and answers bearing upon matters pertaining to passenger traffic, subjects which agents or their assistants are likely to meet with in the daily routine of business, and all are enjoined to thoroughly digest the information contained therein in order to handle these matters to the satisfaction of the department, as well as of the traveling public.

The main points covered being the proper routine of passengers, the reservation of sleeping car space, the various forms and classes of tickets to be used, the mileage to be computed and the proper checking of baggage.

It is our endeavor to educate the telegraphers in the manifold duties they have to perform with the view of promoting efficiency in the different departments and throwing open several avenues for promotion.

We give precedence to our employees and advance them as rapidly as their ability warrants and as opportunity affords, all of which conduces to good service, harmonious relations and a tendency to remain with our company.

The paper was received with applause.

President Chenery: Gentlemen, this paper is one of particular interest to us all. We know what we are up against. You know the necessity of educating our employees on the standard rules and method of operation. Before entering upon a discussion of it, it seems fitting that a vote of thanks be tendered Mr. Hope for his valuable paper.

Mr. Davis moved that the thanks of the association be tendered Mr. Hope, and the paper be printed in the minutes,

Which was seconded,

And agreed to.

Mr. Selden: This paper presents the most full and complete idea of an examination that I have yet met with. I think it well, perchance, to name what we do on our particular line. We have what we call a catechism in which is embodied questions pertaining to the rules in force. I would have brought some with me, but the fact that we are just finishing a new set of block rules and changing our rules somewhat gave rise to some questions that had not existed before. However, I will say to the gentlemen that when they are printed so as to meet the requirements I will be glad to receive any requests and will see that they get a copy of the rules.

I note that Mr. Hope states that they promote telegraphers in the train despatcher's office. On the B. & O. we promote the copying operator. And I am a great believer in copying operators. You are at times short of good despatchers. One trouble I find with superintendents on all the railroads with which I am acquainted has been that when there is a spasm of economy it strikes the copying operator. I think if that were the last place to economize it would be a good thing. I do not think you can give the train despatcher any too much help.

We have a card record. There is a card sent to my office giving the name, whether married or single and recommendations. Every time that man is reported his card comes in. If suspended I will know the cause. I have a complete record whether he be on one division, or two, or three, or four, as the case may be. We find it of great advantage.

The discipline of telegraphers is accomplished through division officers. We have no traveling telegrapher as such. We tried for a long time to have the train despatcher become, also, division operator, his title to be division operator and have charge of the despatchers. But we found his time was so occupied in despatching duties that the telegraph necessarily did not receive his first attention. We have recently a division operator who reports to the superintendent of the division and the superintendent of telegraph. who is appointed by the division superintendent with the concurrence of the superintendent of telegraph. He is enabled to get all over the division and visit personally every office, and it is required of him to make, upon a form, a report of the condition of each office, not in a general way. but specifically. The columns of the report are arranged. condition of battery, cleanliness of office, condition of materials, supplies, lenses, etc.

We do not take as much time in the examination of telegraphers as called for in the paper. Not because we would not like to, but because we haven't the opportunity. More than that I will say that we do not permit men to work until they have been placed in the office for a certain length of time and performed the duties they will be required to do. And I want to say to those who have employed as we do fourteen to eighteen hundred telegraphers, it is economy in every way to have efficient operators, reporting both to the division superintendent and to the superintendent of telegraph so that the latter may be in touch with the entire department all over the system.

Mr. Rhoads: There are one or two thoughts that come to me in addition to what is specifically mentioned in the paper, and one is with reference to commercial work of railroad companies. I take it for granted almost every road here represented handles commercial business at their various offices.

We have a great deal of trouble in getting efficient reports as the chief despatcher's don't take proper care in seeing that operators are instructed in this feature of the work. I think Mr. Hope's road is to be congratulated upon giving as much attention as they do to the examinations. I was asked to take part in the discussion of the paper, but it is gone over so thoroughly it don't seem to need much discussion. Some of the boys may call this a pipe dream. I did not know they were doing all this but am assured by Mr. Hope it is a fact. Mr. Hope's having, also, the signal department, shows where his gray hairs are coming from.

One thing spoken of by Mr. Selden I think is important.

Ten years ago a copier was thought a necessary luxury. Every one who has had experience in the despatcher's office knows it is a hard matter for an operator to get all his message work done and all that is required of him, and pay very much attention to what the despatcher is doing. He has no opportunity to even talk to the despatcher. I am sorry to say our company has done away with copiers. It is of great assistance for a despatcher to have a copier, while on the other hand I can cite some instances where the despatcher prefers to copy his own orders.

Mr. Williams: In glancing over papers read in former convention of the character just submitted I note with astonishment the small number on this pivotal subject. All superintendents of telegraph do not employ all telegraphers directly for their railroads, but all superintendents do have an interest, more or less, in doing so. I am convinced that if this association required a portion of its time to be devoted to this vital question at every convention, paper or no paper on the subject, we would find an increased interest and better attendance. Superintendents could not afford to be absent and I am quite sure deliberations along these lines would please our general managers as it strikes the kernel.

The subject before us is of especial interest and apropos just at this time in view of recent legislation requiring augmentation in the forces handling traffic over our railroads, especially telegraphers, after March 1st next. The ideal condition as outlined by Mr. Hope is desirable, but just now is not practicable with us in the south. We realize and appreciate that something in this direction is necessary, but we have not men on the waiting list as appears to be the case, as outlined. Our ranks are being depleted constantly by those most desirable leaving for occupations holding out greater inducements, and it is a question with us how the vacancies and the new positions are to be filled.

It was thoughtful of the president to have copies of papers to be read sent out in advance that we might give them the careful consideration their importance demands. Having a copy of Mr. Hope's paper in hand has enabled me to discuss its merits with some of our management to evolve ideas pro and con. I have had many questions propounded and have tabulated a few. I will read them and will be pleased for Mr. Hope to enlighten us.

What is the maximum and minimum of pay?

Mr. Hope: $52.00 to $90.00.

Mr. Williams: What are the hours worked by telegraphers?

Mr. Hope: Eleven hours.

Mr. Williams: Are the operators organized?

Mr. Hope: Yes.

Mr. Williams: Do the operators teach telegraphy?

Mr. Hope: Not required to, but do in some cases.

Mr. Williams: Is the system of teaching operators in telegraph offices maintained by the railroad?

Mr. Hope: Yes.

Mr. Williams: Are the applications for positions of telegraphers received from men along the line or from other roads?

Mr. Hope: Along the line and from other roads.

Mr. Williams: If an applicant fails after the third day of examination, does he receive any recompense from the railroad company for the time he has put in in being examined?

Mr. Hope: If we do not discover that he may not be competent before any such length of time, he is paid for two or three days' services.

Mr. Williams: It would appear from the paper that you have on hand a number of applicants who have passed the examinations and were ready to step into an opening; are these men so held under pay?

Mr. Hope: Yes; in most cases as helpers, clerks, and messengers.

Mr. Williams: Do you have any trouble in getting applicants to come to your office for examination?

Mr. Hope: No.

Mr. Selden: There is one feature we adopted some time ago which we termed "regular extra operator." The general manager gave us authority to place certain operators in "regular extra" positions on each division. This meant that a man would not have to take just what extras he could get, but would get regular pay. Outside of this we have what we know as extra men who get as much work as we can give them. But the "regular extras" have regular pay.

Mr. Taylor: The points in the paper are complete and have been pretty thoroughly discussed. There are one or two things I want to ask information on. I notice Mr. Hope states, ten per cent. of the applicants are disqualified on account of defective eyesight; three per cent. on account of defective hearing, and six per cent. on account of defective color perception. Is that a pretty fair average, generally speaking?

Mr. Hope: My chief operator says that is about right—ten per cent.

Secretary Drew: I want to ask if it is allowable to remedy that defect by the use of spectacles?

Mr. Hope: We have tried quite a number and helped them out.

Secretary Drew: You allow them to use glasses?

Mr. Hope: Yes, sir.

Secretary Drew: Very much to my surprise I found the examining surgeon of our road was rejecting men simply because they came to him with glasses. I immediately protested against such an antiquated notion as that, that a man was unfitted to be a telegraph operator because he used glasses to aid his sight. I think that has been remedied so far as our road is concerned.

Mr. Hope: We are not hunting for men with glasses, but you will find quite a number of the men are men of some years and all wearing glasses.

Mr. Taylor: There is one other point that interested me, and that is his statement that in proportion to the number of men employed over twenty-one as against the same number between eighteen and twenty-one, the men over twenty-one are in the majority of those who have caused trouble in the operation of train movements. It has been my experience that a hard and fast regulation that a man must be of so many years of age is unnecessary and is injurious to the service. There are many operators twenty years of age that are safe.

Mr. Ryder: This paper deals largely, of course, with the early education and examination of the operator, but little has been said about his education after he is employed on the road. But isn't that where more work should be done than has been done so far as the railroads of the country are concerned? I believe a good deal of the trouble that has been experienced has developed after the men were on the pay-roll. That is being recognized apparently more and more. I believe that is a great big factor in the proposition at present.

Mr. Selden: A division operator should be a first-class train despatcher—born out of a train despatcher's office. This gets rid of some of the trouble we used to have in the old days when a division operator was not a despatcher. He did not seem to have the same weight with the superintendent as though he had been a despatcher. Frequently a despatcher would say he could not get along with certain operators and that would keep your division operator quite busy in selecting other people. But we are fixed now so if a despatcher makes a complaint of that character we can show the superintendent whether our trouble is with the operator or despatcher.

President Chenery: There is certainly a great deal of meat in this paper.

Mr. Rhoads: There is one point passed over lightly, and that is relative to the sight examination. I think the way it was left the feeling was in favor of looking upon it in a light manner. It occurs to me that is quite an important feature and one of the important details of the service. A gentleman came to my office and had his son. an intelligent young man, with him. This gentleman said he understood his son after completing his education in telegraphy could not procure a position on account of having to wear glasses. I thought it an opportunity to make a test case and he was ruled out. The general superintendent asked if he would be able to see the markers on a train if he were without his glasses and he admitted he could not. He says: "Suppose you were at work at night in a telegraph office and you mislaid your glasses or broke them, you admit you could not see the signals until you were able to procure another set of spectacles?" That threw a new light on the question, and I think that is one of the points to be taken into consideration. It would be well to bring this to the attention of the men who are running these telegraph schools, to be sure in taking in students to take in men with first-class eye-sight. It is important.

President Chenery: An invitation has been extended by Mr. Griffith to visit the school where telegraphy is taught at Elmira, N. Y. I would suggest it would be well for those gentlemen who can to see Mr. Griffith at our noon recess so he may have some idea of how many would like to avail themselves of this opportunity. We are all up against the proposition and will be so more than ever within the next nine months. The school at Elmira, I understand, is one of the most up-to-date schools, that has recognition by the railroads—or by a railroad.

Mr. Selden moved the thanks of the association be tendered Mr. Griffith for the invitation and the members avail themselves of the opportunity,

Which was seconded,

And agreed to.

President Chenery: Before proceeding to the next paper, the Secretary has some telegrams and communications that perhaps it would be well to read at this time.

Secretary Drew read the following:

Chattanooga, Tenn., May 4, 1907.

P. W. Drew, Secy. Ass'n Ry. Tel. Supts.

Dear Mr. Drew: As I am out of telegraph service, I cannot retain my membership in the association. Will you kindly have my name transferred to proper list. I do not expect to attend the June meeting, but hope to meet you at the Jamestown Exposition.

Yours sincerely,

G. L. LANG.

Jackson, Tenn., June 18, 1907.

P. W. Drew, Secy. Ass'n Ry. Tel. Supts., Atlantic City, N. J.

Sorry I cannot be with you, but hope the meeting will be of unusual benefit to our cause and all present will have an enjoyable time.

E. E. TORREY.

Chicago, Ill., June 18, 1907.

P. W. Drew, Secy. Ass'n of Ry. Tel. Supts.

Will arrive Atlantic City about 11:00 A. M. Thursday. Please tell Mr. Ashald and Mr. Griffith.

G. W. DAILEY.

The Ass'n of Ry. Tel. Supts., Mr. E. A. Chenery, Pres.,
Marlborough-Blenheim Hotel, Atlantic City, N. J.

Dear Sir:—The American Telephone and Telegraph Company and The Delaware and Atlantic Telegraph and Telephone Company take pleasure in extending the courtesies of their lines, betwen the hours of 6 P. M. and 9 A. M., to the members of your Association during its meeting at Atlantic City, June 19th and 20th, 1907.

The service will be rendered from the pay station located in the Marlborough-Blenheim Hotel, and members desiring to use same are requested to show their badges to the operator as a means of identification. Yours very truly,

P. W. MILLER,

Division Agent Railway Department.

Secretary Drew: We haven't received anything from the W. U. T. Co., but I have no doubt but what as usual they extend their courtesies to us if we want to do any social telegraphing.

Mr. Griffith moved the thanks of the association be tendered for courtesies extended.

Which was seconded,

And agreed to.

President Chenery: As we have to meet at 2 o'clock for the photographer, it might be well for us to adjourn for luncheon.

Mr. Selden moved the convention adjourn,

Which was seconded,

And agreed to.

FIRST DAY—AFTERNOON SESSION.

(Wednesday, June 19, 1907.)

The convention was called to order by President Chenery at 2:30 o'clock P. M.

Secretary Drew read the following telegrams:

New Haven, Conn., June 19, 1907.

P. W. Drew, Blenheim Hotel.

Owing to important matters which have just arisen, I regret once more inability to attend the convention; very much disappointed as I fully intended to be present. I hope the convention may be very enjoyable as well as profitable to all concerned.

N. E. SMITH,
Supt. of Tel.

Englewood, Ill., June 18, 1907.

P. W. Drew. Secy. Ass'n Ry. Tel. Supts.

Greeting to all. Wish you a successful meeting.

W. J. HOLTON.

Atlanta, Ga., June 18, 1907.

E. A. Chenery, Pres. Ass'n Ry. Tel. Supts.

I regret exceedingly my inability to be with you to-day; hope you will all have a good time.

J. LEVIN.

Chicago, Ill., June 19, 1907.

E. Chenery, Pres.

Regret very much that I am unable to attend. Wish you a prosperous meeting.

F. H. VAN ETTEN.

New York, June 18, 1907.

Mr. P. W. Drew, Secy. Ass'n of Ry. Tel. Supts.

Dear Mr. Drew: At the last moment I find that Mrs. F. and I cannot attend the meeting this week on account of the serious illness of my sister. We had looked forward with considerable pleasure to the meeting this year and regret very much that we cannot be with you. Wish you all a good time and an interesting meeting. With kind regards to all.

Very respectfully,
L. B. FOLEY.

Chicago, Ill., June 19, 1907.

P. W. Drew.

Best wishes for successful meeting. Remember me kindly to all.

F. F. FOWLE.

Secretary Drew: We are always glad to interrupt the proceedings at any time to present the names of our friends. I wish to present for membership J. B. Fisher, Superintend-of Telegraph, Penna. R. R., Philadelphia; G. A. Dornberg, Chief Lineman, Penna. Lines, west. Pittsburg; E. A. Patterson, Asst. Supt. Telegraph. C. M. & St. P., Milwaukee; and associate member. R. D. Brixey. New York.

I move that these gentlemen be declared elected,

Which was seconded,

And agreed to.

President Chenery: I wish to speak of the souvenir that has been distributed to the members by the American Tel. & Tel. Co. It is an American standard wire gauge, something that will be found to be very useful. In connection with this the representative of the company has asked me to say that the leather case which was to accompany this gauge was not completed in time, but it is to be manufactured and will be mailed to the members, so you will have the case and the gauge complete.

President Chenery: Next in order will be the reading of papers. I would suggest, as we have had "Education of Telegraphers in Railroad Work," it might not be out of line if we take up the paper, entitled, "The Superintendent of Telegraph; What He is vs. What He is Not." Mr. Bentley is not present and I will ask Mr. John L. Davis to read the paper.

Mr. Davis read the following paper:

St. Louis, June 5, 1907.

Mr. A. B. Taylor, Supt. Tel. N. Y. C. & H. R. R.,
New York, N. Y.

Dear Sir: In response to your favor of March 13, file

2417, I am sending you with this a copy of paper to be presented at the Atlantic City convention this month. By direction of President Chenery, I have furnished copies to the gentlemen appointed to discuss the paper. I am sorry that it was impossible for me to turn the paper out sooner, but trust that it will still be available to you at this late date.

Respectfully,
F. E. BENTLEY,
Supt. Telegraph.

THE SUPERINTENDENT OF TELEGRAPHY.

What He is Versus What He is Not.

At the time that the subject of this paper was first selected, I thought it an easy matter to trace back to the origin of the telegraph for its history, and that it would be even a less difficult task to look up the experience of former Telegraph Superintendents, to determine by precedent just what the office was intended to be and the functions that it should cover. It appeared to be especially easy to learn of the Railway Telegraph Superintendent, since the history of the past short century must have included the experience of them all.

My purpose at the start was in line with the endeavor of others before me, to suggest ways and means of standardizing, and show the advantage of having the functions of that office well defined and made uniform, in comparison with the seemingly diversified duties now involved. But at every step in my investigation, I saw the futility of such an attempt, and was finally forced to the conclusion that so long as the title "Superintendent of Telegraph" is assigned to man, his duties will be too numerous to mention and the scope of his achievement be bounded only by his ambition.

I shall take the liberty to digress from the main question, and simply give some views, more or less seriously, that I have acquired in my short experience, thereby at least affording the gentlemen appointed to lead the discussion some opportunities to separate flaws from facts.

The term "telegraph," I found, applies to a multitude of contrivances, the electrical telegraph being most generally used and probably, therefore, the best known application. The word is of Greek origin, meaning "to write afar off." Some authorities say that the ancient Greeks first employed telegraphic methods, and that the semaphore, the word meaning "sign-bearer," was the one which they most used. This system was widely copied by all nations and is in practical use to-day by almost every railroad on earth. Other historians credit the Chinese with the first mechanical telegraph invention.

Whatever or whenever may have been the origination of the telegraph, its application in one way or another dates back to the beginning of time.

God telegraphed the thought that made the world. He was, therefore, not only the first telegrapher, but superintended the job.

Adam and Eve also did a turn at telegraphing, when, like most telegraphers, they were still young and full of innocence. One telegraphed the other some glances which were answered so quickly that mankind has been sorry ever since.

Explorers of uncivilized countries report that savages telegraph by placing members of the tribe in a line on top of adjacent hills, to beat signals on drums to each other. If the distance is too great for the sound to carry, they use visible signals of various kinds.

Almost as crude a system was used in this country during the War of Independence. It was called Washington's telegraph, presumably because of its having been used in his time. A portable mast, with a tub or barrel on top, a movable flag on one side and a basket suspended from the other side, made a combination by which about sixty different signals could be displayed.

No earlier than the year 1825, inventions along the line of electric telegraph were practically stopped by the positive declaration of a prominent European investigator that the project of an electro-magnetic telegraph could not possibly be successful. All of us have a good idea of what has actuallly occurred in that line since.

A German inventor recently succeeded in telegraphing a portrait over more than one thousand miles of wire, within eighteen minutes' time, and expects to soon overcome the high resistance of submarine cables, so that a photograph may be sent from London to New York in twelve minutes.

Not long in the future, a typewriter operator will doubtless be able to send messages any distance with great rapidity and print them in plain English at the receiving end.

The wonderful progress in telephone invention justifies the prophecy that we shall soon see a life-likeness of the person with whom we talk at any distance.

From the earliest crude systems to the present, changes in form and usage have been numerous and frequent. At no time has any method been entirely adequate for the purpose designed. No sooner is an improved device put into commercial use than its capacity becomes overcrowded, if it is at all practical. This is especially true in the present period of prosperity.

Makers of equipment hesitate to standardize parts of apparatus, for fear that some new improvement will change their plans before the pieces can be turned out of the shop. Most users of equipment are slow at installing new inventions, evidently anticipating that something more adequate and less expensive will soon be devised, or that slump in business will occur, making improvements unnecessary.

In recent years a growing spirit of antagonism has shown itself by the passage of radical laws in various states, which seriously affect the operation of railroad and telegraph companies, and serve to further slow up the expansion of lines. as well as the adoption of new improvements.

As the telegraph has been and will be used in its many forms, so must the Telegraph Superintendent keep abreast of its progress, but in the stress of present conditions, I conclude that he is primarily a censor, not only of traffic handled, but of the manner and methods of handling it.

Telegraph traffic is peculiar and various. Wire telegrams probably constitute the greater part of it and deserve closest attention.

A message of any kind should be transmitted from sender to addressee in the quickest possible time and in the most intelligible way. It is the censor's duty to see that this is done.

Writers of telegrams are largely responsible for congestion of wires and consequent delay to their business. They route messages over the wire, when the mail would do as well, and make little or no effort to abbreviate their language; but do not hesitate to complain of poor telegraph service if their wired "letters" are delayed. The censor may effect a partial remedy by diplomatic persuasion.

I believe a system of coupons or stamps, good for so many messages containing so many words each, to be issued by the general manager or general superintendent, to the head of each department that has occasion to send telegrams, would serve to curtail telegraphing within proper bounds. Routing of telegrams over wires that are less burdensome than others figures considerably in their prompt handling, and criticism by the chief in charge of this feature should be encouraged.

The telephone service also needs constant censoring, for the double reason that equipment is more expensive, and easily accessible for those to whom "talk is cheap." The telegraph censor will probably find that the best means of checking telephone use is to have a record kept of stations or lines that are often reported busy, and get after the persons who use those lines to cut short their talk.

In both the telegraph and telephone service the censor must also wield his sceptre to keep the operating force in line. Unfortunately, the talent needed for this work seems to abound mostly in other trades and professions. The majority of those who do learn the business are content to perform mechanically the work put before them, without thought of excelling; hence it is left to the censor to select those in whom he may see the latent fires of ambition and then to light and keep the flame ablaze. Probably the surest way of doing this is by judicious promotion, and, in the process of training, to give the young worker to understand that it is up to him to secure promotion by making himself competent for a better position.

Along with the Morse telegraph and the telephone there are the signal systems,—interlocking, train order and automatic block, also the telautograph, bulletin board and time clock, all of which properly belong to the telegraph class, although on many railroads these systems are, because of expediency, supervised by other departments.

Telegraph contracts, construction, equipment and maintenance alike come in for censor under the telegraph department head. We should, therefore, have a thorough knowledge of every detail, and be able to forsee the effect of development in the future.

Blackstone says of the best lawyer, "It is not the one who knows the law, but he who knows where to find it." In a great measure, it is so with the Telegraph Superintendent: He should know what is good for the life and welfare of his department, where to find it and how to bring it in to the best advantage.

So much for what, in my opinion, the Telegraph Superintendent is or should be.

I shall rely on my colleagues appointed to discuss the question to lay bare the other side, for in my sight, the Telegraph Superintendent is all right, excepting that he is not very numerous, when known under that title alone.

Current official lists show there are more than one thousand railway companies in the United States, Canada and Mexico. The official roster shows the title "Superintendent of Telegraph" less than one hundred times. In many instances, this title is given in combination, adding "Superintendent of Signals, Car Service, Mail, Trainmaster, Chief Despatcher," etc.

But the very nature of the work on every railroad of any consequence, requires the use of the telegraph in some form or other, which must need supervision. It is plain, therefore, that on most roads the Telegraph Superintendent is there, but "unknown, unhonored and unsung." Also that this phase of railroad work is not carried on with sufficient aggressiveness. begotten of persistence and hard licks, to enlarge the field in that line and justify a distinctive title for the one responsible in handling it.

Believing as I do that much good is accomplished by the Association of Railway Telegraph Superintendents in diffusing knowledge which is helpful to all engaged in such work, I suggest that the Secretary be delegated to petition for membership, the trainmaster or chief despatcher of those railways that do not show in their official roster the title of Superintendent of Telegraph.

The paper was received with applause.

President Chenery: The superintendent of telegraph is becoming more numerous in this association, as our membership list will show. We have at this meeting added fifteen new members, the largest addition ever made in the history of the organization.

Mr. Rhoads moved the paper be received, discussed and spread upon the minutes,

Which was seconded,

And agreed to.

President Chenery: The paper is open, as are all others, for discussion, and the chair will be glad to hear from some member.

Mr. Selden: What he is, is a pretty hard thing to say; what he is not, is still harder. Some superintendents have said they would not think of suggesting things to their general managers. I think one of the principal troubles with the superintendents has been their extreme modesty. The duties of the superintendents vary on the different systems, of course. Some systems are small lines comparatively and do not have the duties to perform that superintendents on the larger ones do. It would be a hard thing to standardize.

Mr. Davis: I think, speaking broadly, that the superintendents of telegraph who are active members of our association represent something like 128,000 miles of railroad. Now, by taking the Railway Guide and checking the names of the roads which show the title of superintendent of telegraph, and by taking the number of wires per mile on the road I have the honor to represent as a basis for calculation, we can safely presume that our active members are held responsible for enough telegraph wire to encircle the globe thirty-eight and one-half times. Now, if it were not for that wire the commerce of this country would undoubtedly come to a standstill. And if we give the superintendent of telegraph credit for keeping these wires in working order, he must, also, at least be given some credit for keeping commerce and traffic moving, and I believe after all that we are really of some importance.

Mr. Groce: I cannot add anything to what has been said. The telegraph department is of importance, but we should not have swelled heads. The standardizing of the position of superintendent of telegraph I hardly imagine can be carried out in the United States. The different contracts between the telegraph companies and the railroad companies could hardly be standardized. It would be almost useless to talk of anything of that kind. But. I believe there is a tendency now for the railroad companies to pay more attention to the telegraph department and to the suggestions of the superintendent of telegraph. The signal end is becoming so important. and within the next few years it will be largely forced upon the telegraph department. In some cases the superintendent of telegraph can fill two positions very well. There has been a tendency to couple the engineering department and the signal department. and I believe the signal and transportation departments. but I believe it would be better to have the signals under the superintendent of telegraph.

Secretary Drew: I am pleased to see Mr. Sperry with us. Some years ago he was with us at one of our meetings. when we were struggling along financially and were barely able to win out. being some fifty. sixty or seventy dollars behind. Mr. Sperry came to me and says: "Drew. why don't you put a few advertisements in your minutes. You can get advertisements in there that will help support your association." On that suggestion and by his encouragement we adopted that plan after the Omaha meeting. and you see the results, for the treasurer's report to-day shows instead of sixty or seventy dollars behind. ninety dollars ahead. And a great deal of that credit is due to Mr. Sperry and the suggestion that he made.

President Chenery: We are certainly glad to have Mr. Sperry with us. His suggestions at all times are valuable.

Mr. Sperry: Thank you.

Mr. Rhoads: There is one thought comes to me that is sometimes lost sight of, and that is. I presume almost every man here, who as a telegraph superintendent represents two corporations, the railway company and the Western Union Telegraph Company, and my observation has been sometimes, not only with the road I represent, but some of our neighbors, that some of our usefulness—what might be our usefulness—for one corporation or the other has been lost sight of because of the tendency of a great many railroad officials to look upon us as one-sided. Where one furnishes the material and the other the labor to put the material in actual service we have to be thoroughly impartial in our dealings with corporations.

At to what a superintendent is and what he is not, he might be compared to a Jersey sweet potato. I have for a good many years traveled around the country, from the Great Lakes to Florida, from Boston to San Francisco, and wherever I would see sweet potatoes they would invariably tell us they grew in Jersey. Yesterday in coming here from New York I said to my wife: "You can feast your eyes on Jersey sweet potatoes. You won't see anything but sweet potatoes from here to Atlantic City." When we got here I asked her if she observed the sweet potato hills. She said: "Sweet potatoes must grow on pine trees." So it is with us, I think, sometimes we are what we are not and we are not what we are.

(Laughter.)

President Chenery: We have with us Mr. John B. Taylor, of the General Electric Company. Mr. Taylor has very kindly consented to prepare a paper on inductive disturbance to telegraph wires caused by high tension lines paralleling railroad right-of-way. The recent legislature of Arkansas passed a law granting power distributing companies, for public uses, the right to use the railway companies' right-of-way for their poles and wires. The bill became a law, I assume, before the legal department of the several railroads fully realized the importance of it. I was requested to secure information from the various telegraph superintendents as to what effect high tension wires paralleling the right-of-way would have as to danger to life and property and the effect upon telegraph and telephone service. This, as I remember, was suggested by Mr. Griffith. Mr. Taylor has consented to favor us with a talk on the subject. I have pleasure in introducing Mr. John B. Taylor, of the General Electric Company.

INDUCTIVE DISTURBANCES TO TELEGRAPH LINES.

By John B. Taylor.

Due to the current flowing in any wire, there is an electro-magnetic field surrounding this wire extending to an indefinite distance, and gradually decreasing in strength. If the current in the conductor is alternating, the strength of this field is continually changing, and it is this change which induces electromotive forces in any conductors which chance to be in the field.

Due to the e.m.f., or voltage on the conductor, there is an electrostatic field extending from the conductor to an indefinite distance and decreasing in strength with increased distance. This electrostatic field attracts charges in neighboring conductors, so that in general there is an alternating current in any neighboring circuit as the result of both electrostatic and electromagnetic induction.

These electrostatic and electromagnetic fields exist about the wires of direct current systems, as well as alternating current systems; but it is only the changing strength of these fields which induces disturbing currents in neighboring wires; in other words, a wire has induced in it an electromotive force proportional to the rate at which the strength of the electromagnetic field changes, and, similarly, charging currents flow in and out of a wire proportional to the rate at which the electrostatic field changes. For this reason inductive disturbances are always of an alternating character, although we may have inductive disturbances from a direct current system where the value of the current changes rapidly.

Considering the matter then from merely the mathematical and physical standpoint, any conductor wherever placed will have currents induced in it as a result of currents in other circuits, no matter what distance there may be between them. From the practical point of view, however, it is only when the magnitude of these induced currents is sufficient to cause interruption or inconvenience to the regular operation of the circuits that they are classed as "disturbances." Disturbance, therefore, is an entirely comparative term, and depends quite as much on the apparatus and conditions of operation on the disturbed circuit as on the circuit, which is ordinarily blamed for the trouble. In other words, a 60,000 volt transmission line, conveying thousands of kilowatts, just as certainly has currents induced in it from a neighboring telegraph line as the telegraph line has currents induced in it from the power transmission line. However, the extra currents in the transmission line as a result of the working telegraph line, are not classed as disturbances, and are, therefore, ordinarily and properly overlooked.

of adjacent hills, to beat signals on drums to each other. If the distance is too great for the sound to carry, they use visible signals of various kinds.

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In both the telegraph and telephone service the censor must also wield his sceptre to keep the operating force in line. Unfortunately, the talent needed for this work seems to abound mostly in other trades and professions. The majority of those who do learn the business are content to perform mechanically the work put before them, without thought of excelling; hence it is left to the censor to select those in whom he may see the latent fires of ambition and then to light and keep the flame ablaze. Probably the surest way of doing this is by judicious promotion, and, in the process of training, to give the young worker to understand that it is up to him to secure promotion by making himself competent for a better position.

Along with the Morse telegraph and the telephone there are the signal systems,—interlocking, train order and automatic block, also the telautograph, bulletin board and time clock, all of which properly belong to the telegraph class, although on many railroads these systems are, because of expediency, supervised by other departments.

Telegraph contracts, construction, equipment and maintenance alike come in for censor under the telegraph department head. We should, therefore, have a thorough knowledge of every detail, and be able to forsee the effect of development in the future.

Blackstone says of the best lawyer, "It is not the one who knows the law, but he who knows where to find it." In a great measure, it is so with the Telegraph Superintendent: He should know what is good for the life and welfare of his department, where to find it and how to bring it in to the best advantage.

So much for what, in my opinion, the Telegraph Superintendent is or should be.

I shall rely on my colleagues appointed to discuss the question to lay bare the other side, for in my sight, the Telegraph Superintendent is all right, excepting that he is not very numerous, when known under that title alone.

Current official lists show there are more than one thousand railway companies in the United States, Canada and Mexico. The official roster shows the title "Superintendent of Telegraph" less than one hundred times. In many instances, this title is given in combination, adding "Superintendent of Signals, Car Service, Mail, Trainmaster, Chief Despatcher," etc.

But the very nature of the work on every railroad of any consequence, requires the use of the telegraph in some form or other, which must need supervision. It is plain, therefore, that on most roads the Telegraph Superintendent is there, but "unknown, unhonored and unsung." Also that this phase of railroad work is not carried on with sufficient aggressiveness, begotten of persistence and hard licks, to enlarge the field in that line and justify a distinctive title for the one responsible in handling it.

Believing as I do that much good is accomplished by the Association of Railway Telegraph Superintendents in diffusing knowledge which is helpful to all engaged in such work, I suggest that the Secretary be delegated to petition for membership, the trainmaster or chief despatcher of those railways that do not show in their official roster the title of Superintendent of Telegraph.

The paper was received with applause.

President Chenery: The superintendent of telegraph is becoming more numerous in this association, as our membership list will show. We have at this meeting added fifteen new members, the largest addition ever made in the history of the organization.

Mr. Rhoads moved the paper be received, discussed and spread upon the minutes,

Which was seconded,

And agreed to.

President Chenery: The paper is open, as are all others, for discussion, and the chair will be glad to hear from some member.

Mr. Selden: What he is, is a pretty hard thing to say; what he is not, is still harder. Some superintendents have said they would not think of suggesting things to their general managers. I think one of the principal troubles with the superintendents has been their extreme modesty. The duties of the superintendents vary on the different systems, of course. Some systems are small lines comparatively and do not have the duties to perform that superintendents on the larger ones do. It would be a hard thing to standardize.

Mr. Davis: I think, speaking broadly, that the superintendents of telegraph who are active members of our association represent something like 128,000 miles of railroad. Now, by taking the Railway Guide and checking the names of the roads which show the title of superintendent of telegraph, and by taking the number of wires per mile on the road I have the honor to represent as a basis for calculation, we can safely presume that our active members are held responsible for enough telegraph wire to encircle the globe thirty-eight and one-half times. Now, if it were not for that wire the commerce of this country would undoubtedly come to a standstill. And if we give the superintendent of telegraph credit for keeping these wires in working order, he must, also, at least be given some credit for keeping commerce and traffic moving, and I believe after all that we are really of some importance.

Mr. Groce: I cannot add anything to what has been said. The telegraph department is of importance, but we should not have swelled heads. The standardizing of the position of superintendent of telegraph I hardly imagine can be carried out in the United States. The different contracts between the telegraph companies and the railroad companies could hardly be standardized. It would be almost useless to talk of anything of that kind. But, I believe there is a tendency now for the railroad companies to pay more attention to the telegraph department and to the suggestions of the superintendent of telegraph. The signal end is becoming so important, and within the next few years it will be largely forced upon the telegraph department. In some cases the superintendent of telegraph can fill two positions very well. There has been a tendency to couple the engineering department and the signal department, and I believe the signal and transportation departments, but I believe it would be better to have the signals under the superintendent of telegraph.

Secretary Drew: I am pleased to see Mr. Sperry with us. Some years ago he was with us at one of our meetings, when we were struggling along financially and were barely able to win out, being some fifty, sixty or seventy dollars behind. Mr. Sperry came to me and says: "Drew, why don't you put a few advertisements in your minutes. You can get advertisements in there that will help support your association." On that suggestion and by his encouragement we adopted that plan after the Omaha meeting, and you see the results, for the treasurer's report to-day shows instead of sixty or seventy dollars behind, ninety dollars ahead. And a great deal of that credit is due to Mr. Sperry and the suggestion that he made.

President Chenery: We are certainly glad to have Mr. Sperry with us. His suggestions at all times are valuable.

Mr. Sperry: Thank you.

Mr. Rhoads: There is one thought comes to me that is sometimes lost sight of, and that is, I presume almost every man here, who as a telegraph superintendent represents two corporations, the railway company and the Western Union Telegraph Company, and my observation has been sometimes, not only with the road I represent, but some of our neighbors, that some of our usefulness—what might be our usefulness—for one corporation or the other has been lost sight of because of the tendency of a great many railroad officials to look upon us as one-sided. Where one furnishes the material and the other the labor to put the material in actual service we have to be thoroughly impartial in our dealings with corporations.

At to what a superintendent is and what he is not, he might be compared to a Jersey sweet potato. I have for a good many years traveled around the country, from the Great Lakes to Florida, from Boston to San Francisco, and wherever I would see sweet potatoes they would invariably tell us they grew in Jersey. Yesterday in coming here from New York I said to my wife: "You can feast your eyes on Jersey sweet potatoes. You won't see anything but sweet potatoes from here to Atlantic City." When we got here I asked her if she observed the sweet potato hills. She said: "Sweet potatoes must grow on pine trees." So it is with us, I think, sometimes we are what we are not and we are not what we are.

(Laughter.)

President Chenery: We have with us Mr. John B. Taylor, of the General Electric Company. Mr. Taylor has very kindly consented to prepare a paper on inductive disturbance to telegraph wires caused by high tension lines paralleling railroad right-of-way. The recent legislature of Arkansas passed a law granting power distributing companies, for public uses, the right to use the railway com-show the advisability of using a metallic circuit, which when installed should be installed in such a manner as to give the full benefits to be derived from a metallic circuit. It also seems not unlikely that satisfactory duplex systems can be developed for metallic circuits, which should give the two wires of metallic circuit the same capacity they now possess as single grounded wires.

Many of the points considered apply equally well to telephone systems, and in many other respects the telephone requires special treatment, which is not touched upon at all in this paper.

In most cases of inductive disturbances there will be two parties involved, and it should be apparent that these two parties should confer freely as to the best means of eliminating or reducing disturbance. The engineers of the power companies are not likely to be conversant with all the details of the telegraph business, nor are the telegraph engineers any more likely to know as much about the conditions of operation of the transmission system. There is no doubt that in some cases inductive disturbances could be materially reduced, if not practically eliminated, at little or no expense to either party by consideration in conference of all the factors involved. It appears not improbable that the increasing number of electrical transmission systems. and the tendency to increased speed by the automatic working of telegraph lines will make this general question of inductive disturbance a more important one in the future than it has been in the past.

The paper was received with applause.

President Chenery: Mr. Taylor, we certainly appreciate your remarks very much. The thanks of the association are extended to you.

Mr. Taylor, A. B.: As I understand Mr. Taylor's remarks, they relate to metallic circuit lines. I want to ask what the effect would be on a three-wire line, the power line transposed, say, every four miles, and the telephone line transposed every half mile, what would the change in the conditions be if the top wire in the system instead of being transposed with the other two is carried straight through. That is a condition which has come about on the Niagara Falls power line alongside of our West Shore telegraph line. In that case the Niagara Falls power line is carried on one side of the right-of-way and the telegraph line is carried on the other side. The average distance, I should say, between the two lines where the power line is on the right-of-way is probably seventy-five or eighty feet. At certain places the power line leaves the right-of-way and runs off for a half mile, but the greater part of the one hundred and ten miles is on that right-of-way an average distance of eighty feet. We have our telephone line on the telegraph poles and we haven't noticed any disturbance from that. Recently they have been cutting out the transpositions on the top wire and putting it straight. So far as I know we haven't suffered any serious disturbances from it. I have wondered just what would be the effect in making that change.

Mr. Taylor, J. B.: I have never seen a three wire power line transposed as Mr. Taylor describes, and I would be inclined to think the top wire is a grounded wire. I cannot imagine anybody running one wire directly through and going to the trouble of transposing the other two. There are plenty of cases where three phase lines are run through without transposition, and it would be a queer proceeding to run one wire directly through and transpose the other two. Soon after the Atlantic City meeting I have learned that wires on this system have been changed as described by Mr. A. B. Taylor; the reason being to have a number of lightning discharge points at the top of pole all connected to the same wire of the system. J. B. T.

Mr. Taylor, A. B.: When this power line was installed there was a transposition every four miles, but since that they have straightened out the top wire.

Mr. Taylor, J. B.: Haven't they run an extra wire, also? The sky wire is often used as a ground line. The Mexican companies started without this ground wire, but later added one and changed it to a ground wire. There is a great increase in the tendency to put up ground wires many years ago.

Mr. Kelsey: The ground line puts telephone lines out of business, and the electrical companies have proved there is a remedy by having the metallic line transposed. I want to ask Mr. Taylor what he knows about taking care of such trouble.

Mr. Taylor, J. B.: Theoretically ,of course, it should be possible for metallic telephone circuits to exist in any sort of electrostatic or electromagnetic fields. Transpositions eqnalize matters, but the separation of the wires will vary and the points of transposition might come between two poles where it would be impracticable to theoretically place them. What is quite as important in this question of disturbance to telephone lines is the matter of insulation.

(Mr. Griffith related his experience in the matter oı disturbances.)

Mr. Groce: The I. C. has had a varied experience with telephone circuits because we have a great deal of telephone installation and by metallic circuit. The suggestion has been made—and probably Mr. Taylor can advise us—that the transmission wire carrying these high potential currents be encircled with a few windings of comparatively good-sized insulated wire, to use the wire as a coil, the telegraph circuit not to be broken, but carried through.

Mr. Taylor, J. B.: There is no question but what some such scheme would be an effective scheme. But it is hard to say what would be the most effective scheme, all things considered.

Mr. Camp: Regarding the amount of induction. As you increase the distance is the proportion direct to the distance or inversely as the square of the distance?

Mr. Taylor, J. B.: As a matter of fact, the induction falls off rapidly as you increase the distance, which can be mathematically computed.

Mr. Camp: A metallic line does not entirely eliminate earth disturbances. We have a number of high potential lines paralleling ours and have had a few complaints regarding the working of telegraph wires, but on investigation I found they were caused through a partial ground on the transmission wires.

Mr. Taylor, J. B.: We have in the last year made experiments with transformers between power lines and signal wires neutralizing the electrostatic and electromagnetic induction. In some cases such a scheme would appear serviceable. I cannot point to any particular road at this time that has such a scheme in practical operation.

President Chenery: I think the engineer of the A. T. & T. Co. might give us some information upon the subject.

Mr. Chetwood: So far is I know Mr. Taylor has described nearly every device that has been tried. Nothing perfectly satisfactory has been discovered to neutralize induction, though every device has had a certain amount of success under certain conditions.

Mr. Rhoads: Our tracks are paralleled for miles and miles with trolley lines, with wires on the adjoining right-of-way, and, for obvious reasons I presume, for more than half the mileage the high tension wires are carried on the side of the track near the steam road's right-of-way, so it places their wires very close to us.

About three years ago Indianapolis was the first to instal one of these single-phase high potential circuits and that seems to prove satisfactory from the standpoint of the trolley company. Visitors are coming to our territory from all over the United States to study the question, with the result that it seems to be spreading. The C. H. & D. paralleled their line, and immediately the effect was such it knocked out the W. U. ticker service as well as interfered with the despatcher's wire so they frequently could not use it. During the last six months they have come over on to our Indianapolis and Cincinnati line and the probabilities are they are going to put it on other lines. Now the W. U. have a second pole line between these two cities on which service is interfered with in addition to our block wire which happens to be on this line of poles. Up to the present time we have been unable to get anything from the W. U. as to what their electrical department propose to do to obviate these disturbances. So far as I see, each corporation looks to the other to take some steps—if necessary, legal. That continues to spread in all directions. The subject is one of great interest to us because we have a thousand miles of block territory and that is going to be knocked out if the single-phase shall supersede the other, as it seems fair to do.

Mr. Maver: The subject has been so thoroughly discussed I do not think there is much left to be said. A remedy must be supplied either by eliminating the single-phase system or by avoiding its effects on telegraph and telephone circuits. Many minds are now at work on this exceedingly important problem and doubtless a happy solution of it will eventually be found.

Mr. Taylor, J. B.: There is a great increase in the tendency to put up ground wires. Many years ago they commenced to do it with barbed wire, but such wire is a mean proposition and for that reason it fell into disfavor. I would not advise anybody to use barbed wire, as the short barbs are of no use as additional protection and are a great disadvantage in handling and hard to clear in case of trouble. This ground wire should be good, stout wire without any barbs.

Mr. Parsons read the following paper, entitled: "Inductive and Other Foreign Disturbances on Telegraph Wires," by W. C. Stowell, wire chief, C. & A. R .R.:

INDUCTIVE AND OTHER FOREIGN DISTURBANCES ON TELEGRAPH WIRES.

By W. C. Stowell, of the Chicago & Alton R. R.

Foreign disturbances on telegraph wires, other than those caused by ordinary interruptions such as crosses, breaks and grounds, may be classed as follows:

Atmospheric, consisting of oscillatory waves, or disruptive discharges; conductive, consisting of cross talk and leakage from other telegraph wires, leakage from power circuits, or earth currents from power circuits; inductive, consisting of induction from other telegraph wires, from single phase or multiphase grounded power circuits, or from metallic circuit alternating current power circuits.

It is the intention in this paper, to simply give the result of several years experience, with such remedies for these troubles that suggest themselves, or have been tried in practice and found useful.

Under atmospheric disturbances will come lightning and the rare cases of waves passing over the earth during periods of excessive sun-spot or aurora borealis activity. The latter are so infrequent as to require no special remedy. The only known remedy is to employ metallic circuit by patching wires together at terminals and lift the grounds. This remedy failed four years ago when tried between Chicago and Buffalo, N. Y., on a single Morse Western Union circuit.

Disruptive discharges, including lightning and contact with high voltage power circuits are protected against by the various well known types of lightning arresters, requiring no special attention here except to give a few comments on the more common types, with the attendant results. The "Argus" arrester, consisting of a choke coil on porcelain form, with a ground connection very near convolutions of choke coil, has not proved satisfactory owing to breakage of the porcelain. It is also doubtful if the choke coil feature is of any great value. Some recent authorities claim the initial lightning discharge shows itself in one direction and not of high frequency, the high frequency waves, when present, being a secondary phenomena caused by the capacity and inductance in circuits producing them inductively, or by condenser action. It is our experience that ordinary relays exert the choking effect and force the static into carbon or plate arresters, and that when cable poles as well as switchboards are protected by fuses and carbon block or non-arcing metal protectors, relays will not be damaged. An exception to this is noted in the case of low resistance relays made by putting spools of 150 ohms instrument in multiple. Such relays often go short to the core after lightning. This is not noticed with series wound relays. The worst case of relays burned out in our experience was due to ground connection having been taken off an Argus arrester at cable pole near terminal office.

While some authorities question the necessity of switchboard protection in addition to cable terminal arresters and fuses, it is our opinion, based on the frequency of fuses opening and carbon block or their equivalent arresters going grounded, and considering the danger of high voltage contact, that switchboard protection is desirable where it can have intelligent supervision, for by using smaller fuse at inside protection often time is saved by inside fuse blowing before outside protection does, saving a lineman trip to cable protection.

In testing for trouble after lightning, time may be saved by rough measurements with voltmeter and milameter. A few experiments with voltmeter will enable one to judge approximate distance of an open fuse, by amount of static kick on voltmeter, while a ground can be developed by application of high voltage to burn it through and measured with shunted milameter, using cell or two dry battery when ground is close, resistance of such cells being so small, simple calculation will give the approximate resistance to ground. A shunt, accurate enough for this, may be quickly made by reducing full scale deflection through suitable steady battery circuit, to one-tenth or one-hundredth by piece of copper or German silver wire shunted around instrument and cut to proper adjustment.

In testing for a partly open fuse or bad connection it should be remembered that relays give a high voltage kick back, in many cases enough to cause a partly open fuse or bad joint to close. In testing for such a trouble, after same has been developed, care should be taken to avoid such relay discharge by using very small battery and milameter, to avoid closing the bad connection until same has been located in the ordinary way by having stations ground for test. The contrary is true for grounds, a high voltage should be used to burn them through, in certain cases it has been found possible to supply alternating current through condensers from telephone generator to maintain a short circuit or ground through a bad contact, at same time resistance is measured in ordinary with direct current instruments.

At large terminals it may be convenient to put a relay and bell in ground circuit to give notice when a line goes grounded, so can be remedied before causes delay.

Some magnetic devices have been constructed to avoid leaving a line open or grounded after lightning has disappeared, but we have no data as to their performance. Power companies are now experimenting with a water resistance to carry off lightning, with very satisfactory results.

Conductive disturbances from lines on same poles known as cross talk may be separated from inductive trouble by tests with voltmeter and ammeter. Being detected as direct current on instruments and identified by opening successive circuits. An alternating current voltmeter is useful under recent conditions. A cheap form of magnetic vane voltmeter may be used as a milammeter for alternating currents, with slight correction in calibation, resistance such an instrument is usually too low for its deflections to be proportional to volts in telegraph work.

The remedy for conductive trouble is to patch circuits apart that show leakage to each other, or reduce battery on disturbing wires when possible, if necessary throwing out disturbing circuits. When leakage is from direct current power circuits, increased battery power or better conductivity is remedy. If from alternating power circuit increasing margin by more battery or better conductivity, or inserting inductance and shunted capacity as discussed later are suggested remedies. Cure is better insulation and higher conductivity. When these fail, only thing to be done is to move.

In a paper before this association at Indianapolis, by Mr. A. E. Roome, in June, 1904, entitled, "Pacific Coast Telegraph Conditions," conductive troubles are efficiently treated, see pages 128 to 133, proceedings of that meeting.

At this point it is proper to state that anything to increase the working margin on a circuit will tend to overcome these conductive and inductive disturbances. This will include improved conductivity, proper proportioning battery, and best insulation obtainable. We are working but two single wires out of each gravity battery on the Alton railroad wires at one point where ten wires terminate.

and but one or two wires at other battery terminals from each gravity battery. Since changing from three wires to a battery to but one or two, we are able to work through wet snow and fog on circuits that were unworkable in such weather before. Current used is kept at fifty to sixty milliamperes on local wires equipped with thirty-five ohm relays. That is, dry weather current is fifty or sixty.

Earth currents may be classed as direct or alternating. Interference on short wires is most noticeable, since the disturbing pressure more nearly approaches the line voltage as the latter becomes lowered for shorter lines. Remedy is increased margin of working current, metallic circuit, or in case of alternating disturbance, insertion of inductance in ground connection.

A successful method adopted by the writer to overcome such earth currents from direct current trolley cars between East St. Louis and Wann, Ill., on an eighteen mile block wire, with nine offices each working to a ground was to lift the ground connections and leg the former ground connection to a through wire at each station. Latter wire was a single Morse circuit from Chicago to St. Louis, with no intermediate offices between the block stations. This arrangement was successfully operated for two years during which time neither the block nor the through wire interfered with each other, and the earth currents were of course eliminated from the block wire. If the through wire went open in the block station district we were still able to work through it around via the block, trouble showing up on the block and being located between two adjacent block stations. If either wire went crossed or grounded trouble was quickly located between two adjacent block stations by proper tests.

The above arrangement has now been taken off to enable us to cut an intermediate office in on the through wire, and to experiment with heavy battery to overcome the earth currents. We have had about one month's experience since going back to the grounded arrangement, and by increasing the battery about one hundred per cent., have been working fairly well, although one or two block offices still complain of current in block sounders getting very weak or very strong when trolley car is in certain positions. We are correcting this now by adding still more battery at the points most affected.

We also encountered alternating earth currents on a block wire between Pontiac and Dwight, Ill., which were so bad as to render circuit useless at times. Before we could experiment with remedies operator's block was replaced by electric blocks. These earth currents came from a single phase trolley car system using 3,300 volts on trolley, using their rails for return circuit, 25 cycle General Electric equipment, about two hundred feet from the Alton tracks.

The value of inductance to be inserted in ground connection to choke back alternating earth currents would have to be determined by experiment; we find that the amount of inductive buzz on telegraph wires is largely influenced by the length of the circuit, its condenser capacity tending to accumulate more buzz, therefore conclude on short sections of block wires which are generally arranged to a ground at each station, a reasonable sized choke coil could be built to absorb such buzzing.

Such impedance coils must be built on laminated cores. closed magnetic circuit. made rather large so as to get enough turns on them to get the inductance without unduly increasing the ohmic resistance. We are familiar with such impedance coils used with Composite telephones, but these telephone coils, being designed to only stop the very high frequency telephone waves, are too small for 25 cycle currents.

Induction from other parallel circuits indicates the following remedies:

First—Move.

Second—Use metallic pairs, no grounded circuits, transposing if necessary.

Third—Increase working margin of current.

Fourth—Introduce high impedance in series with the line at each end of exposure, with condensers shunted to ground between the impedances.

First and second remedies require no discussion.

Our experience with third remedy, increased margin, is successful as applied to our Chicago Bloomington quadruplex, distance 126 miles, iron wire, working balance in dry weather 3,200 ohms, dynamo battery at Chicago, gravity at Bloomington.

This quad was interrupted on an average ten minutes each hour by buzz on neutral relays and at longer intervals by same on polar side, trouble showing at both ends. This buzz would come past the repeating sounder and if adjusted away from it had no margin to work relays. Interference comes from single phase trolley induction between Dwight and Pontiac, Ill., distance 18 miles, battery used before remedy applied, 220 volts at each end. This successfully overcame the trouble, by giving us more margin on common side, and holding polar relay quiet during the periods of strong induction, and we worked it this way for several days, but found that 350 volts was too much, as Chicago dynamo pole changer would arc after three or four hours use and require constant cleaning and adjustment, notwithstanding the fact we used a good spark condenser around it. We then reduced the pressure to three hundred volts at each end and have been successfully operating at that pressure for over a year, with no interruption from the trolley induction, except when the margin is abnormally reduced by wet snow or fog, have had one or two such days when it was necessary to abandon neutral side for few hours, and have also been compelled to keep the gravity battery at Bloomington right up to more than 280 volts to keep the buzz out, the induction showing up in proportion to the weakened condition of battery when neglected.

The Western Union have abandoned their quads between Chicago and St. Louis, Chicago and Kansas City, Chicago and Bloomington, Chicago and Peoria, Chicago and Springfield, Ill., and to one or two other points reached by Chicago via this route and are either using other routes or working the circuits as polar duplexes; when doing the latter they find it necessary to operate at the highest potential, 350 volts on the longer circuits, to keep the polar sides quiet. With lower potentials the polar sides would buzz at intervals.

The fourth remedy, impedance and shunted condensers has not as yet been worked out. We find that 10 henrys inductance will annul about two volts buzz on 150 ohm relay. We know that 20 to 40 thirty-five ohm relays on the local wires between Bloomington and Chicago will entirely annul the buzz on circuits whose companion circuits on same route show bad interference, when latter have no intermediate offices cut in. The buzz seems to be a trifle worse on copper wires than on iron. We have tried inserting various kinds of choke coils at terminals such as telephone repeating coils, and small impedance coils made for Simplex telegraph and telephone combinations, but cannot entirely annul the buzz. Western Union people have made some experiments with repating sounders on their leased copper wires, but with very unsatisfactory results.

It certainly looks like shunted condensers and impedance coils would take off the buzz and we understand some roads, the C. M. & St. P. for example, can work their quads through several 150 ohm relays, showing a certain amount of inductance will not ruin a quad, although the writer's experience has been that telephone repeating coils, simplex telephone choke coils, several relays and certain other coils inserted in our Chicago-Bloomington quad circuit rendered the neutral side too sluggish. An exception was noted in the case of our Simplex circuit worked on a pair of number 14 coppers wires from Bloomington to Chicago. the telegraph side of which works through two coils known by the telephone people as "37A" repeating coils. We find our Chicago quad, even with the 300 volts on it, works first class through this impedance. These are large coils of low ohmic resistance, about 40 ohms to the telegraph current, and very high impedance to alternating currents of voice frequency.

Calculation shows the ohmic equivalent of 10 microfarads capacity for 25 cycles is 637 ohms. The impedance of one 150 ohm relay is about 235 apparent ohms to 25 cycle sine wave alternating current.

We have tried to work a Simplex telegraph circuit through a pair of telephone wires, distance between terminals 126 miles, with 10 micro-farads in each side at each end. That is, the capacity was in series with each side of the telephone wire at the terminals for the purpose of talking and ringing through it, to separate the telephone side from a grounded common battery system, we found this capacity too great to work the Morse circuit through—the telegraph relays were too sluggish and the terminals could not break each other. We understand others have had similar experience, the Illinois Central among others. It is a familiar condition on some of the A. T. T. Co. lines.

The problem, then, is one to be submitted to Electrical Engineers to design such capacity and inductance as will dispose of the foreign impressed alternating pressure without rendering single or multiplex Morse systems too sluggish or reducing working margin too much. Our idea would be to connect it up so the impedance coils would be at the ends of the exposed sction, but making the ground connections to the condensers at points far enough away from exposed sections to escape alternating earth currents, if necessary moving the impedances and condensers to stations distant from terminals of exposure, in order to escape such earth currents.

The last case to be considered, induction from metallic circuit power feeders, requires same treatment as single phase grounded circuit exposure.

Our experience has been limited to a forty thousand volt transmission line, parallel to us for about twenty-five miles, but from five hundred feet to quarter of a mile away from the railroad's wires. We experience no interference from this system, but the long distance telephone people were closer and had to put in more transpositions and at certain places, to move.

In this connection will mention experience on simplex telephone circuit, Chicago to Bloomington, on which serious noise developed from the Pontiac Dwight induction, when we used impedance coils with open magnetic circuit on solid cores. We cut in more transpositions and got the line quiet as long as the telegraph side was left open, but noise was bad when Morse side was closed. Substitution of laminated core, closed magnetic circuit impedance coils entirely removed the noise from telephone side, latter coils having the same resistance and same number of turns as the solid core ones had.

The extension of high pressure long distance transmission lines, prolific growth of single phase alternating current traction, electrification of steam railroads and development of water power resources throughout the world, is invading every state in the Union, and radical action is necessary to keep these circuits away from our telegraph and telephone lines.

The electrical engineering profession, as a whole, having many years ago abandoned the telegraph field for more alluring work, now show a marked indifference to the disastrous effects of their transmission systems on those older servants of the people, the telegraph and telephone. The time is now at hand for a change, and we trust that after experiencing the serious effects of such interference on electrified steam railroads like the New York, New Haven and Hartford, with its heavy currents and single phase trolleys, that the best engineering talent will be employed to contrive methods and design instruments to work under these new conditions.

The commercial companies, telephone, telegraph and railroads, should unite in their efforts to compel the power companies to recognize their prior rights, and legislation should be devised and pushed to restrict the ruin of existing lines of communication by power circuit invasion.

Mr. Selden moved that the convention adjourn, to meet at 8:15 P. M. in executive session,

Which was seconded,

And agreed to.

SECOND DAY—MORNING SESSION.

(Thursday, June 20, 1907.)

The convention was called to order by President Chenery at 9:30 A. M.

Secretary Drew: We had a telegram yesterday from Mr. Foley regretting he could not attend on account of the illness of his sister. I received a telegram as I went out of the afternoon meeting in which he advised the death of his sister. So I responded to the telegram and sent him, as from the association, an expression of our sympathy with him and his family.

President Chenery: The first paper we have for this session is Mr. Maver's.

Mr. William Maver, Jr., read the following paper:

WIRELESS TELEGRAPHY, SOME OF ITS PRACTICAL AND COMMERCIAL ASPECTS.

By William Maver, Jr.

Part 1. Technical Aspects.

Wireless telegraphy now appears to be settling down on a practical basis. It is finding its field to be where all those who have not been actuated by interested motives have consistently stated it would be found, namely as a means of communication between ships at sea and between ships and the shore. How long it will hold this field undisputedly depends upon the measure of success that may attend the efforts of those who are now endeavoring to perfect wireless telephony. At least half a dozen inventors are at work on this problem in this country and Europe and it is reported that the wireless transmission of speech has been experimentally successful up to distances of several miles overland; but apparently much remains yet to be done before wireless telephony, even for short distances, becomes an accomplished fact. Should this hoped for result be achieved, however, it is evident that for many purposes it will displace wireless telegraphy. For example, probably one of the chief reasons why wireless telegraphy is not already universally installed on all manner of sailing vessels and steamships is the necessity for employing an expert Morse operator to transmit and receive messages. Wireless telephony, even if only available for a distance comparatively short, obviously could be installed to advantage in the officer's room of every ship that floats the ocean, lake, river or harbor, and perhaps on railway trains as well, for any purpose that might arise.

Wireless telephony is not yet here, however, while fortunately for those that go down to the sea in ships, wireless telegraphy is here and it is already installed or is being installed on every lighthouse and on the vessels of every important navy and steamship line in the world. It is probably easily within bounds of accuracy to say that there are now over 2,000 wireless stations, including ship and shore stations, in operation in various parts of the world and this number is being added to daily.

The distances covered by wireless telegraphy in regular operation may be set at from one mile to fifty or one hundred miles. When the statement is made, as it frequently has been, that messages have been received from ocean going vessels several days out from New York, it may be taken for granted that these messages have been received at one or the other of the Atlantic Coast stations within wireless signaling distance of the vessel, and by these stations repeated by overland wire telegraphy to New York. There is no doubt that messages are received under favorable conditions at distances of several hundred miles from shore, but these are exceptional cases. No regular interchange of business is at present carried on at those distances.

While we frequently run across the statements of interested brokers in wireless telegraph stock that trans-Atlantic wireless telegraph will shortly be accomplished, it is noticeable that Marconi, Fessenden and De Forest have of late been silent on this subject. Fessenden indeed has with commendable frankness, practically admitted that the difficulties of trans-Atlantic wireless telegraphy are at present well nigh insurmountable. His experiments were continued for nearly one year between Massachusetts and Scotland. He found that there are at least two serious obstacles in the way of trans-Atlantic wireless signaling. First, atmospheric absorption of the electric wave energy of the signals. Up to distances of 1,000 miles this absorption is not very marked, but beyond this point it becomes very important. The other difficulty consists in the inability to maintain syntony or tuning of the apparatus, at the respective transmitting and receiving stations. The difficulty, in the words of Mr. Fessenden, "is in getting the stations which are to communicate to maintain their frequencies sufficiently regularly." It was found impossible to receive messages when the frequency varied one part in one million. This it may be noted, is equivalent to saying that if a telegraph system which depended for its successful operation upon the synchronism of wheels at the sending and receiving stations, should vary one part in one million the system would not operate. While Mr. Fessenden is hopeful that these difficulties will be overcome, the prospect for an immediate realization of this hope is not very encouraging. But fortunately again there is no real necessity for trans-Atlantic wireless telegraphy, or cableless telegraphy, as some wireless experts take pleasure in terming it. The Atlantic cables are still doing business at the old stand and there is every reason to believe that they will continue to do so for many years. Singular as it may seem to some people there is, apart from occasional injury to the cables, no method of telegraphing that is as reliable as submarine cable telegraphy. The reasons for this are obvious. The cable, year in and year outs, works undisturbed by changes in weather conditions. Lightning storms do not affect its operation, and vagrant currents from neighboring and unneighborly electric traction circuits, or induction from high tension alternating current systems, can never approach within harmful distance of its sensitive apparatus. Similar immunity from these disturbing factors in overland telegraphy would there is no doubt be gladly welcomed by the members of this association.

Aside from the filings coherer it may be said that the most prominent type of detectors now in use are the magnetic detector employed by the Marconi interests, the carborundum detector employed by the De Forest Company and the various electrolytic detectors of the Fessenden and Shoemaker types. The magnetic detector, the carborundum detector and the electrolytic detector require a telephone receiver for the reception of signals. The magnetic detector was described in the author's paper on "Improvements in Wireless Telegraphy," read before the Indianapolis convention of this association. The carborundum detector consists of a crystal or carborundum which is clamped between two metal electrodes. Otherwise so far as the arrangement of circuits is concerned, it simply displaces the filings coherer, but does not operate a relay. The electrolytic detector consists of a small cup containing a dilute solution of nitric acid, into which the terminal of a very fine platinum wire is placed. Another wire enters the acid from the bottom of the cup. When current from a small dry battery is passed through the solution by means of the fine wire, polarization takes place, and current ceases to flow in the circuit. Incoming electric waves appear to dissipate this polarization, causing variations in the current of the local circuit and sounds corresponding to dots and dashes are heard in the telephone receiver.

The De Forest Audion is also one of the more recently invented wireless detectors. This detector, briefly described, consists of an incandescent filament in a vaccuum, shunted by a local circuit in which is a battery and a telephone receiver. Incoming electric oscillations appear to affect the electrical condition or equilibrium of this circuit and set up variations of current therein which are heard as dots and dashes in the telephone receiver. This receiver was fully described in the Transactions of the American Institute of Electrical Engineers for 1906.

Another detector which promises to be of utility in practical wireless telegraphy is the Silicon detector, the invention of G. W. Pickard. This detector is of the thermo-electric type of wireless receivers. It produces its own electro motive force. Its electrodes are pure Silicon and a metallic element of low resistance. The energy of the incoming electric oscillations are converted into joulean heat (C 2 R) at the element having high resistance (the Silicon) which heat is converted at the contact point into a short pulse of direct current in the telephone receiver; and a long or short continuation of these pulses produces a dash or dot in the receiver. Mr. Pickard states that a fragment of Silicon merely held with suitable pressure between two flat ended brass rods gives excellent commercial results. This detector has the advantage that no battery is required in the local circuit. In sensitiveness it compares favorably with the electrolytic and magnetic detectors, according to tests made by Mr. Pickard. The carborundum detector is about one-half as sensitive as the last named detectors.

It is interesting to note that the telephone receiver has been found to respond to a single impulse of current of very much less strength than is required to energize the most sensitive wireless detector, and were it not for the high inductance of the telephone receiver, the intermediate wireless detector would not be necessary. At the high frequencies used in wireless telegraphy, however, namely of the order of five hundred thousand or one million per second, the inductance of the telephone receiver renders it mute.

An improvement in wireless telegraphy that may lead to important results consists in the use of undamped oscillations with which numerous experiments are now being made by Poulsen, Shoemaker, The Telefunken Company and others.

In the ordinary "spark" gap transmitter, it is known that between each spark or train of sparks there is a rapid falling off or damping of the amplitude of oscillations; consequently the full benefits of resonance in the tuned receiving circuits are not obtainable. Poulsen's method of obtaining undamped oscillations is an amplification of the Duddell "Singing arc" and consists in employing an electric arc of peculiar construction shunted with a capacity (condenser) and inductance of a wireless transmitting circuit.

In Poulsen's device the positive electrode is copper; the negative electrode is carbon. When the capacity and inductance are suitably adjusted rapid oscillations of uniform amplitude are established in the circuit and thence are thrown upon the vertical wire. These oscillations are broken into dots and dashes in the usual way. Unfortunately, thus far, the energy output by this method is low and it remains to be ascertained whether or not the advantages of uniform amplitude by conducing to a better utilization of resonance, will more than offset the disadvantage of reduced energy output.

Another improvement in the practice of wireless telegraphy consists in the employment of electric wave meters by means of which the wave length or the wave frequency may be measured. These wave meters are based primarily on the principle that with an exciting circuit in proximity to a secondary circuit, a maximum current will be induced in the secondary circuit when the two circuits are in resonance, which will be when they possess corresponding inductance and capacity. Knowing the capacity and inductance of the secondary circuit, the frequency and wave length of the oscillations are deducible. (A detailed description of electric wave meters may be found by those interested, in the last edition of the author's work "Wireless Telegraphy.") Increased familiarity of the operators with the apparatus has also naturally tended to improved results in the actual operation of the various systems. Apart from the foregoing noted features and certain improvements in the details of apparatus and the arrangement of vertical wires, there has been comparatively little advance made in the art of wireless telegraphy, during the past one or two years.

A short description of some experiments conducted recently by the Telefunken Wireless Telegraph Company of Berlin, relating to the use of wireless telegraphy between railway trains in motion and fixed stations, may be of interest to the members of this association. The experiments were made on sections of railway track about 12.5 miles in length, with four stations about four miles apart within this distance. The wireless outfit of each fixed and moving station consisted of a filings coherer receiver, and an induction coil transmitter, together with the other apparatus usually employed therewith. A coach containing the wireless outfit was equipped with a rectangular wire suspended by posts about one foot high at each corner of the roof of the coach. The wire was attached to porcelain insulators on the top of these posts. A single wire was led from this wire to the apparatus within the coach. A ground was obtained through the iron trucks of the coach. The fixed station was between the telegraph poles. The aerial wire was erected horizontally between the poles and paralleled the regular telegraph wires for a distance of 193 feet, about one foot therefrom, and was carefully insulated from those wires. A wire connected this aerial wire to the apparatus in the fixed station. The ground was made by a wire connection to the nearby rails. Current for the induction coil was supplied by eight portable storage cells giving 16 volts and having an output of about 3 amperes with a spark gap of .12 inch. The maximum distance of the train from the tracks was 65 feet.

By this arrangement reliable signals were sent and received at a distance of 7.5 miles.

As several of the members of this association have had experience with other methods of telegraphing to and from moving trains, they can probably enlighten the association as to the necessity of improvements over those methods, and also as to the utility of such systems in general.

Part 2. Commercial Aspects.

The opinion of the writer has been frequently asked as to the merits of the great claims that are being made relative to the divided earning capacity of wireless telegraphy by the brokers who appear to have assumed control of the stock selling end of one or more of the wireless companies. A few remarks bearing on these claims may not be inappropriate at this time.

Let us first discuss the wireless telegraph earnings on the basis of the exchange of messages between ship and shore stations. According to the published reports of one of the wireless companies which has its system installed on 78 steamships plying between Europe and the United States, the gross earnings for the year 1906 were approximately

$55,170.00 for messages exchanged between ship and shore stations. This figures out to approximately 25,823 messages for the year, which is equal to a total of 70 messages per day, or less than one message per day per ship. How much, if any, of this revenue goes to the foreign wireless telegraph company that presumably owns the wireless apparatus on the ships, is not stated. Presumably certain royalties may have to be paid by the ship owners for the use of the apparatus, and there may also be additional revenue for "news" service received on shipboard. But granting this, it is difficult to figure out much net revenue after the salaries of officers and operators have been paid.

This is perhaps the best showing that can be made for wireless telegraph companies doing a general commercial business in this country, or with the ships that sail United States waters. When it is stated that hundreds of steamships own their own wireless apparatus outright and do considerable business with government wireless shore stations without charge the difficulty of seeing a bright prospect for the earning of dividends on capitalizations amounting to 6, 8 or 10 millions of dollars by a legitimate exchange of wireless messages between ship and shore stations is largely increased.

One of the large German wireless telegraph companies has confined its business almost exclusively to the manufacture and sale of its apparatus outright to customers, and it is understood they have made fair profits. Several companies in this country are doing likewise. Obviously, therefore, there is no monopoly of this art on the part of any one company, although such a claimed monopoly is the chief stock in trade of certain of the stock brokers referred to.

An analysis of the published claims put forth by certain stock brokers to induce the purchase of stock in a wireless telegraph company shows some glaring misstatements, seemingly at least calculated to mislead prospective customers as to the constructional and operating costs, etc., of the system. Another method to induce purchase of stock consists, or did consist, of sending out broadcast by mail, circular letters offering stock of a wireless telegraph company at $110.00 per share, guaranteeing 5% per annum on the stock for 5 years. This appears a fair enough proposition until it is known that the stock was at the time offered on the New York curb at $30.00 to $36.00 per share. This offer was accompanied by the most glowing accounts, without regard to the difficulties in the way of the prospective earnings of the company, by means of trans-Atlantic wireless telegraphy and by overland wireless telegraphy as well. It is but fair to say that the managers of at least one of the companies whose stock is being used in this way has disclaimed any responsibility in the matter. Unfortunately it is to be feared that the brokers were only too successful in unloading stock to unsophisticated purchasers on this basis.

The paper was received with applause.

Mr. Selden: This is a most interesting paper. A friend of mine accosted me sometime ago and said he had $20,000 he was going to invest in that stock. I asked if he would like to make $10,000. He said, "Very much." I said, "All right. Give it to me now and keep the other $10,000." (Laughter.) The claim at that time was made that they were going to transmit messages for ten cents, as having no wires to maintain they could do it and make a profit. I told him from the experience we had had in the telegraph business, that, without counting the expense of wires whatever, every ten cent message cost eleven and seven-eighths cents, and that I thought he had better keep out of the business.

President Chenery: This association is certainly indebted to Mr. Maver for this paper. Every topic committee puts Mr. Maver down at the head of the list and he has never disappointed us.

Mr. Selden moved the paper be printed in the proceedings and a vote of thanks tendered Mr. Maver,

Which was seconded,

And agreed to.

Mr. Marshall: I have had some experience—I haven't any stock—with wireless telegraphy. We are making a great advance in the uses of wireless telegraphy, and you gentlemen have an opportunity here to see just what can be done. One of our principal stations on the Atlantic seaboard is at Atlantic City, at the end of Young's pier. I just came from there this morning. The station has been sending out news to the ships that are passing for probably an hour. all the principal items of news gone out of the steamships this morning will be printed and the papers placed for the passengers at their breakfasts.

I want to assure you that it is beyond the experimental stage. We have disturbances the same as you have in telegraphing. This station here is as simple as we can make it. to accomplish results. The stations are at intervals all up and down the coast so a steamship can be almost continuously in touch with the shore. We can send messages to the officers and receive orders. In cases where there has been serious accident they have called for assistance and it has been promptly given. So our modern service is thoroughly a success.

I think the most expensive experience-lesson the wireless people had to learn was that of competing with the wire people in the item of news. The wireless telegraphy cannot compete with the W. U. on a ten-cent basis. It cannot be done. Our service costs too much to do that. In fact, we cannot do it on a twenty-five cent basis as we have learned.

There are some places where inland service can be made profitable; where there are intervals of one hundred and fifty miles over rough country and the lines would be destroyed for some reason. We know wireless stations can be so placed as to supplement your lines and hence keep up communication when your lines are down. This will come to some extent, and we are going to present this to you because we have been enabled to get our apparatus so simplified and so reliable that it can be used.

The cost of a wireless telegraph station apparatus, such as we have at Atlantic City and such as you would require, can be sold to you for less than one thousand dollars. You cannot construct many miles of line for that. This apparatus, as I say, has been simplified. We find that by taking a W. U. operator and training him for a week he becomes proficient. To get the sounds coming in correctly the ear has to be trained for the purpose. But taking any ordinary telegraph man in a very short period he will become competent in wireless.

I have made arrangements so you gentlemen can go on the pier and see our station without any charge at the mitting and receiving stations. The difficulty, in the words of Mr. Fessenden, "is in getting the stations which are to communicate to maintain their frequencies sufficiently regularly." It was found impossible to receive messages when the frequency varied one part in one million. This it may be noted, is equivalent to saying that if a telegraph system which depended for its successful operation upon the synchronism of wheels at the sending and receiving stations, should vary one part in one million the system would not operate. While Mr. Fessenden is hopeful that these difficulties will be overcome, the prospect for an immediate realization of this hope is not very encouraging. But fortunately again there is no real necessity for trans-Atlantic wireless telegraphy, or cableless telegraphy, as some wireless experts take pleasure in terming it. The Atlantic cables are still doing business at the old stand and there is every reason to believe that they will continue to do so for many years. Singular as it may seem to some people there is, apart from occasional injury to the cables, no method of telegraphing that is as reliable as submarine cable telegraphy. The reasons for this are obvious. The cable, year in and year outs, works undisturbed by changes in weather conditions. Lightning storms do not affect its operation, and vagrant currents from neighboring and unneighborly electric traction circuits, or induction from high tension alternating current systems, can never approach within harmful distance of its sensitive apparatus. Similar immunity from these disturbing factors in overland telegraphy would there is no doubt be gladly welcomed by the members of this association.

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Another improvement in the practice of wireless telegraphy consists in the employment of electric wave meters by means of which the wave length or the wave frequency may be measured. These wave meters are based primarily on the principle that with an exciting circuit in proximity to a secondary circuit, a maximum current will be induced in the secondary circuit when the two circuits are in resonance, which will be when they possess corresponding in-these instruments consisting of a high resistance transmitter and bi-polar receiver, which, when associated with properly designed induction coils, are used for both local battery or common battery service, and these instruments are known as standard instruments. In what follows the term "standard instruments" will mean the above instruments when used as above described.

The two fundamental conditions that are mentioned above are, of course, not all the factors that determined the efficiency of transmitters and receivers that best answer the many varied requirements of commercial telephone service. A number of other factors have been considered and given weight, a few of the more important ones being as follows:

No matter what class of line that is under consideration the question of cross-talk between circuits in the same cable, or circuits on the same pole line, will largely enter into and determine the proper efficiency of transmitters that should be made standard for commercial service.

In a paper entitled "Transpositions of Telephone Lines, Cross-Talk and Induction," by Mr. F. F. Fowle, and read by him at your annual convention at New Orleans in 1903, Mr. Fowle treated the subject of cross-talk and induction very thoroughly, both from a theoretical and practical standpoint. In this paper Mr. Fowle pointed out the relationship existing between cross-talk and separation between circuits. Mr. Fowle showed how necessary it was to transpose the wires of a circuit at certain determined intervals, the frequency of the transpositions being determined from the number of circuits on the pole line and the relative location of the circuits with respect to each other. He also pointed out that the larger the number of circuits carried on a pole line the more complicated and numerous become the transpositions.

In commercial service, the telephone lines rarely are of less than forty wires, that is, twenty circuits ultimate capacity, and often run up to sixty, eighty, or one hundred wires ultimate capacity. It is thus seen that a system of transpositions for large lines becomes a fairly complicated one. Furthermore, no matter how the actual transpositions are made, that is, whether the wires are transposed according to what is know as the two-pin or the single pin method, the wires that are being transposed are brought fairly close together on the transposition insulators and during damp or rainy weather the insulation between the wires is apt to become low at these points, which, of course, as will be shown later on, is most undesirable from a transmission standpoint.

With the above in mind, it is readily understood that there is a relationship between the efficiency of the transmitter to be used and the transposition of the line circuits. If a more powerful transmitter is used than the present standard, then, in order to prevent cross-talk between circuits on the same pole line, that is, to prevent one subscriber from learning the business secrets of another subscriber, it is necessary at a considerable expense to transpose the circuits much more frequently, with the result that this increase in the number of transpositions introduces the possibilities of transmission losses and in that way cuts down part of the gain in transmission which the more powerful transmitter would otherwise give.

It is also known that it is physically impossible in any of the large cities to carry the circuits necessary for commercial service on pole lines and that cables, either underground or aerial, must be resorted to. The circuits of the cable must of course be transposed for the same reasons that the circuits on a pole line are transposed. This is done by twisting the wires in pairs and these pairs are then made up into a cable by layers, each pair in that way being transposed against the other pairs forming the cable. Now, as Mr. Fowle pointed out, the less the distance between circuits the greater the number of transpositions necessary, so that when wires are twisted together into pairs and then made up into a cable it is at once realized that being exceedingly close together it is necessary to twist the wires closely, that is, put in a large number of transpositions per circuit. It is also realized that there is a limit to the number of twists that can be given to any one pair and still have the wires insulated from each other and obtain a cable of a low mutual electrostatic capacity, that is, a cable of high transmission efficiency.

While in the last few years considerable improvement has been made in the manufacture of cable, still to-day the subject of cross-talk in cables is a serious one, especially in toll cables of high transmission efficiency, and this cross-talk places a limit on the efficiency of the transmitter that can be used for commercial service. The existing standard instruments have been found to best answer the requirements which have to be met regarding volume of transmission and cross-talk when circuits are carried in cable or open wires, and the instruments used for transmission over long or short lengths of cable or open wire, or combinations of both types of circuits.

Another factor which has determined the proper efficiency of transmitters for commercial telephone service is that known as "side tone." You probably know what side tone is, in fact, you have probably experienced the disagreeable effects of side tone when you have found it necessary to shout into a transmitter in order to make the subscriber at the other end of the line understand what you have to say. With an exceedingly sensitive transmitter the side tone becomes so loud as to be intensely disagreeable, and interferes with good transmission. In fact, it might be said, that where there is excessive side tone the effect on the ear is such that it is not in condition to receive to the best advantage the transmission from the distant end of the circuit. In other words, excessive side tone affects the ear so that when a person has finished talking and the party at the distant end starts to talk, the ear is not in the best condition for receiving and understanding what is being said, the excessive side tone having produced a temporary deafness, as it were.

Still another factor which determines the efficiency of the transmitters to be used, is, that with a sensitive transmitter, all noises in the room in which the transmitter is located are taken up by the transmitter and sent out on the line. I think you probably all know how hard it is to carry on a telephone conversation when anyone is hammering in the room, and those of you who have offices close to busy streets, have, in summer time, when the windows are open probably experienced considerable difficulty in carrying on a conversation when heavy traffic is passing by. A sensitive transmitter picks up very easily extraneous noises and transmits them to the line circuit and this factor has been given due weight in determining the proper efficiency of the present standard instruments.

In regard to telephone receivers, the question is often asked why a more sensitive receiver is not used so that a much greater volume of transmission can be obtained, with the same current, than is obtained with the present receiver. The answer to this question is much the same as to the question regarding why more powerful transmitters are not used, namely, on connections between subscribers connected to the same local office the volume of transmission would be too loud for satisfactory service. Cross-talk that now exists in cables and on open wire lines and which now is not noticeable, would, if more sensitive receivers were used. become troublesome and make necessary more numerous transpositions per circuit, which, as before pointed out, results in introducing transmission losses, and in that way counteracts the advantage of the more sensitive receiver. Furthermore, all line noises due to light leaks on a toll line for instance, or due to induction from neighboring electric light or power circuits, would be magnified, if a more sensitive receiver were used. I feel safe in saying that in the case of many circuits which are slightly noisy, due, for instance, to a leak on one of the wires, the noise not being very noticeable with the present standard receiver, would, with a more sensitive receiver, become so noticeable as to make the circuit unfit for commercial service. Increased side tone also is an argument against more sensitive receivers the same as against more sensitive transmitters, and the amplifying of extraneous noises applies to the receiver in the same way as it does to the transmitter.

To summarize what has been said, the transmitters and receivers which are in commercial service to-day and which have been designated as standard instruments are the ones that have been found to be best adapted for universal use, under the varying conditions that have to be met with, taking the telephone plant as it to-day exists.

It may be asked that if the existing standard instruments are considered to be the best adapted for universal use, considering the telephone plant in its entirety, in what way and by what means will the range of commercial telephony be extended, and how will it be possible at some future time, when the lines have been built and circuits are available, to obtain satisfactory transmission over distances much greater than at present. I believe the range of commercial telephony will be extended mostly through improvements in the line circuits themselves rather than by the use of more powerful transmitters or more sensitive receivers. In other words, I believe that the transmission losses in the circuits will be considerably reduced below the losses at present existing, that is, that the circuits will be made of higher transmission efficiency, by several different methods.

Considered, for example, a circuit several hundred miles long over which, under present conditions, a certain volume of transmission is obtained. It is well known that of the amount of current placed on such a circuit by the transmitter, but a small percentage of it reaches the receiver at the other end of the line. The difference between the current placed on the circuit at the transmitting end and the current that reaches the receiver at the distant end represents the transmission losses in the line itself and in the apparatus associated with the line. This difference in the transmitted and received currents is known as the attenuation in the circuit.

Considering a metallic telephone circuit it is known that there are four factors which regulate the transmission efficiency of the circuit, that is, determine the amount of attenuation in a circuit. These four factors are as follows:

R, or the resistance of the circuit per unit of length.

L, or the inductance of the circuit per unit of length.

C, or the mutual electrostatic capacity of the circuit per unit of length.

S, or the shunt resistance of the circuit per unit of length, the shunt resistance being the mutual or the wire to wire insulation resistance of the circuit.

The four factors are related to each other and the relation existing between them can be expressed by the following formula:

$$A = \frac{R}{2} V \frac{C}{L} U x \frac{L}{RCS}$$

where A is the attenuation of the current in a circuit, as previously described.

As it is of course desirable to make the attenuation on the circuit as small as is economically possible, it is at once seen that A can be made smaller by changing any one or all four of the circuit constants, R, L, C, and S. First of all, A can be made smaller by decreasing R, that is, increasing the size of the line wire, namely, using more pounds of copper wire per mile. This, of course, is a most expensive method of improving transmission. Furthermore, as you get up into the larger sizes of line you have to greatly increase the weight of copper to obtain a small improvement in transmission.

For example: a circuit composed of wires weighing 300 pounds to the mile will give approximately the same transmission over a distance 200 miles longer than if the circuit was composed of wires weighing 200 pounds to the mile:

that is, the extra 100 pounds of copper per mile increases the range by about 200 miles. Now, taking a much larger size wire, say, for instance, weighing 800 pounds per mile, this will give approximately the same transmission over a circuit about 140 miles longer than a circuit weighing 700 pounds to the mile. In this case the extra 100 pounds of copper per mile increases the range only about seven-tenths as much as in the previous case. Furthermore, the larger the size of line wire the closer together must be the poles in the pole line in order to carry the heavier load, which means of course more insulators per mile and a lower insulation of the circuit. From the general relationship of cost and transmission, I do not believe that under existing conditions a wire much larger than a No. 8 B. W. G. wire can be justified in commercial service.

The second method of reducing attenuation is to increase L, the inductance of the circuit. Improving transmission in this way is known as loading a circuit and consists of installing in a circuit, at certain indefinite intervals, coils of low ohmic resistance and high inductance, the coils themselves being known as loading coils.

The value of inductance in reducing the transmission loss in a circuit has been known for some time, but no practical method of adding inductance to a circuit was discovered until Dr. Pupin disclosed his work on this subject and made it possible to improve transmission in this way.

But loading also has its limitations. In the first place a loaded circuit requires a much higher insulation resistance than a non-loaded circuit and also the circuit must be of a certain minimum length before the value of the loading becomes apparent in increased transmission. It is a fairly expensive method of improving line transmission as the coils are expensive to make and on open wire circuits must of course be protected from lightning. The greatest success in loading, so far obtained, has been in connection with cable circuits, where the insulation can easily be maintained at a high figure, and on open wire circuits of a gauge of wire smaller than No. 8 B. W. G.

The possibilities of improving transmission by loading are extremely promising; in fact, much has been accomplished already in loading No. 12 N. B. S. G. circuits and also in loading cable circuits. The loading of open wire circuits larger than No. 12 N. B. S. G. has not, however, been entirely successful, but promises to be so in the near future.

Referring again to the formula for the attenuation constant A, you see that a third method of bettering transmission is to decrease the mutual electrostatic capacity of the circuit, that is, make C in the formula as small as is possible. Now the capacity of a circuit depends on the diameter of the wires composing the circuits and on the separation between the wires. The larger the diameter of the wires the greater the capacity, and the greater the separation between the wires the less the mutual electrostatic capacity. This is one of the reasons why part of the gain in transmission which should result from the use of wires of low resistatnce is lost, due to the increase in capacity, the capacity increasing as the line wires increase in size. As the capacity decreases as the separation between the wires increases, it is obvious that transmission can be improved by placing the wires further apart. This of course means a fewer number of circuits per pole line and consequently means a large increase in the cost of circuits to handle a given volume of business. Again, the improvement in transmission due to a separation between the wires of a circuit of 24 inches instead of 12 inches is so slight as to make it a method not to be seriously considered.

The fourth and last method of improving transmission is by increasing the shunt resistance of a circuit, or, in other words, increasing the insulation resistance. From my experience in telephone work I should say that increasing the shunt resistance, that is, increasing the insulation of the circuit, means nothing more or less than good line maintenance and good operating. I think this is one of the best methods of improving transmission on existing circuits, one that is fairly inexpensive and which if gone into thoroughly will show most noticeable results.

Inefficient line maintenance is the cause of poor transmission more often and to a greater extent than is realized. Every slight leak on a circuit provides a shunt path to keep the transmitter current from reaching the receiver at the distant end of the circuit. If the points of low insulation on the wires of a circuit do not coincide and are not of approximately the same resistance, then the circuit becomes unbalanced and noisy, which, of course, means unsatisfactory transmission.

Of two circuits composed of the same size line wires, the one which is perfectly quiet will give better and more satisfactory transmission, than the one that is slightly noisy due to leakage caused by broken insulators, trees, etc., even though a more powerful transmitter is used on the second circuit than on the first.

To obtain first-class line maintenance means a careful inspecting and testing of circuits. Regarding the inspection of circuits, do not trust the inspection to the same persons that do the maintenance work or the work of clearing trouble on the circuits, but have each circuit inspected by a competent wire chief at least once in six months and more often than that if the results of the inspection warrant it. This inspection should be carefully made, and if carefully made, it will be surprising the number of troubles found. A rigid inspection will result in finding many cases of broken or cracked insulators, many cases of loose tie wires and instances will be found where the line wires are off the insulators entirely and are lying on the cross-arm. Too much slack in line wires resulting in swinging crosses and the grounding of the wires on the other circuits of the pole line, also cases where tree trimming is necessary, will be found on inspection trips over the line. When making such inspection it is of particular importance that every soldered connection should be examined, especially at points where the circuit is bridled in and out of offices or cable boxes. At all points where the circuit is protected by arresters of any description, the circuit should be carefully examined to make sure that the arresters are not the cause of low insulation and do not make the circuit noisy.

After a thorough inspection of a line has been made and the troubles have been cleared up, you will be surprised at the improvement in transmission, especially on wet or rainy days, when, before clearing up the troubles on the circuit, it was either noisy or of low transmission efficiency, and in many cases, unfit for commercial service from both reasons.

Many cases of induction from neighboring power or electric light circuits will also disappear after a thorough clearing up of line troubles, following a rigid inspection of the circuit, and the first thing to do whenever a telephone circuit becomes noisy due to electric light induction, is to clean up the circuit and place it in a perfect physical condition.

Besides periodical inspections, the circuit should be regularly tested by the various wire chiefs or others in charge of the circuit along its route, and these wire chiefs (I call them wire chiefs because that is the title given to such men in commercial telephone work) should be provided with the necessary instruments and facilities for measuring the insulation resistance and for the location of crosses, grounds, etc.

The regular tests that should be made by the wire chiefs, should consist of daily tests to determine that the circuit is clear of troubles, this test to be made early in the morning before the heavy business of the day commences; and weekly, or bi-weekly tests, which should consist of accurate insulation and resistance measurements of the circuit, the insulation measurements to include not only the insulation of each wire to ground, but the insulation between the wires of a circuit. The results of these tests should be carefully entered in a log book, together with an entry giving the temperature and the weather conditions at the various stations along the line. From these weekly tests a fair idea of the general condition of line maintenance can be determined, as the insulation results, considered in connection with the weather conditions, will show whether or not there is an abnormal line leakage. The resistance measurements will also show whether there are bad joints of high resistance in the circuit. In commercial telephone work, any wire that does not show an insultation of at least 10 megohms per mile, on a clear dry day, is considered a faulty wire and the cause of the low insulation must be at once located and the trouble cleared.

The proper testing and handling of a telephone circuit in order that it may be kept in first class condition requires the services of several wire chiefs, if the line be of any great length, and money expended in this way is well spent. It is a simple matter to calculate the cost of a circuit, given its length and the number of pounds of copper to the mile, and knowing the cost, it is also a comparatively simple matter to calculate what amount it is economy to spend in the general upkeep of the circuit in order to maintain satisfactory service, and if the subject is approached in this way it will be found that a considerable sum can, with economy, be spent in obtaining the services of competent wire chiefs and on the proper maintenance of the circuit in order that it may be in the best condition for satisfactory service.

The statement was made a few minutes ago that increasing the shunt resistance of the circuit was synonomous with good line maintenance and good operating. Remembering that the shunt resistance of the circuit is simply the mutual insulation of the circuit, that is, the insulation resistance between the wires composing the circuit, it is clear that if a long circuit is in drops at a large number of places, that is, it is available for service at these places, and that when the circuit is used for long haul messages, messages between distant points, and these clearing out drops or signals are bridged across the circuit at the intermediate offices, you have an operating condition which does not tend to give a high mutual resistance between the wires of the circuit, or, in other words, the bridged drops at intermediate offices provide shunt paths for the telephone current, and according to the number and character of the bridges, will depend the amount of current shunted from the receiver by these bridges.

Take, for instance, a long circuit that is in drops at a number of intermediate offices, say at private branch exchanges, and suppose that for messages between the terminals of the circuit, it is cut through at the private branch exchange boards by cords which contain clearing out drops, and that these cords also allow an operator to listen in on the circuit in order to supervise the connection.

Under these conditions each cord with its clearing out drop or signal, places a shunt across the line, which has the effect of lengthening the circuit by a certain number of miles, and if many such cords are in the circuit the effect on transmission becomes serious.

One of the worst features of such an operating condition or arrangement is the fact that the operator can listen in on the circuit, so that you not only have the bad effect of the clearing out drops or signals but also have a large transmission loss, due to the bridged operator's set, in many cases the loss due to a single bridged operator's set is equivalent to lengthening the circuit from fifty to several hundred miles. If many such operators have access to the circuit you can easily understand that the transmission over a long circuit will not and cannot be expected to be satisfactory.

When a long circuit is made up by connecting together several short circuits which are normally in drops at a number of different places, it means that unless a special operating system is put into force there will be several clearing out signals bridged across the line with the accompanying transmission losses, and it also means a loss of circuit time, for if many short circuits compose the long circuit, both theory and practice prove it to be true that at least one of the short circuits will probably be in service when it is needed to make up the long circuit.

If the requirements of the service are such that a long circuit must be in drops, and available for service at a number of intermediate offices, then an operating system should be put into force which will call for the circuit to be cut through at all intermediate offices, not at the private branch exchange by the operator, but at the test board, or test panel, by the wire chief or whoever else is in charge, using a blind cord, that is, a cord without any bridged drops or other bridged apparatus.

To operate in this way, the circuit can be ordered up and down by Morse or else can be ordered up by telephone and down by Morse. Such an operating method is absolutely essential, if satisfactory transmission is to be obtained.

Another operating feature that must be considered is the use of the wires composing the circuit, for Morse work, either by means of composite apparatus, or by simplexing the circuit.

No matter which system is used, a bridge is placed across the line, wherever the composite or simplex sets are located, and these bridges cut down transmission considerably. The simplex set, which contains a repeating coil, is equivalent to lengthening the line, if it be a No. 8 B. W. G. circuit, by about 40 miles, so that you can see that a few such sets would have a serious effect on transmission. The composite set, by which is meant the composite set for a metallic circuit, is of slightly less effect in reducing transmission.

If it is considered advisable to use a circuit for Morse purposes, then for telephone messages beteween terminals, arrrange the operating system so that when the circuit is ordered up and cut through by the wire chiefs at the test boards, the composite or simplex sets are at the same time removed, which insures a good clear circuit between terminals.

Good line maintenance and the use of proper operating methods will do much to insure satisfactory transmission, and if any of you have in your charge long circuits over which the transmission is not entirely satisfactory, may I suggest that you consider the above remarks, and see whether or not you have a remedy for your trouble in your own hands.

A method of improving transmission over existing circuits which is used to a certain extent and which also has its limitations is by installing telephone repeaters.

The telephone repeater virtually consists of a combination of a receiver and transmitter, the receiver acting on the transmitter and in that way the telephone current, placed on the line at one of the terminals, is relayed and renewed by means of the repeater. Of course, a specially designed repeater circuit must be associated with the repeater, in order that it may be actuated by telephone currents from either end of the line. The circuit used is of the Wheatstone Bridge type, and from its nature, requires that the length of line on both sides of the repeater be of approximately the same distance and of the same character. This is one of the limitations to the use of the repeater. Again, on account of cross talk between circuits on the same pole line, or in the same cable, the telephone repeater must place on the circuit a current not any greater than is placed on the circuit by the transmitter, so that this also is a limitation to the amount of improvement to be gained by its use.

Another feature to be considered is, that while the length of circuit on both sides of the repeater must be approximately the same, there is also a minimum length that can be used, and furthermore, this minimum length must be free from bridged apparatus, or else the repeater will re-act on itself and howl.

The use of a repeater requires good line maintenance as you can readily see, and in one way it may be called a good detector of poor line maintenance, or of circuit trouble, for the repeater will surely howl if there be low insulation or high resistance crosses on a circuit in which it is used.

In commercial telephony considerable use is being made of the telephone repeater in long circuits which are expressly used for messages between the terminals of the circuit or from points beyond the terminals.

In what has been previously said the intention has been to point out some of the reasons why the existing standard instruments best met the varying conditions of commercial telephony, the necessity for having instruments that can rightly be said to be best adapted for universal use, and also there has been described some of the methods that can be employed to better transmission over existing circuits, and to extend the range of service, when a demand for it exists, between points more widely separated than at present require long distance service. I wish now to say a few words about transmitters that are more powerful than the standard transmitter, even though their use is prohibited by the nature and requirements of commercial telephony.

To begin with, I think it is well known that it requires very little ingenuity to produce a powerful transmitter. As an example of what can be done in producing a powerful transmitter, I will say that I once listened to transmission over a circuit of No. 12 N. B. S. G. wires 250 miles long, and containing several miles of underground cable, the transmitter used being one that operated on five amperes of current at a potential of 100 volts. The volume of transmission was deafening and the cross-talk on all other circuits on the pole line was such as to render them unfit for commercial service. Such a transmitter, of course, has no commercial value, and can be justly classified with a number of others of a similar nature as a freak transmitter. It is my hope that I may never again have to listen to transmission from such an instrument.

Again, I can conceive of but one or two situations that will allow of the use of powerful transmitters, and the peculiar conditions which theoretically will allow of the use of such instruments have not been met with in practice. In each case where it at first seemed as though the situation demanded the use of transmitters slightly more powerful than the standard it has been found that by improving line maintenance and operating conditions, by increasing slightly the amount of current furnished to standard transmitters or by the use of telephone repeaters the necessity for powerful transmitters has been obviated, and to my mind all of the above features should be carefully gone into and studied before even considering the use of special instruments.

I intended in this paper to describe two installations containing some features that I believed would be of interest to you and with which I have been associated in an engineering way. I think, however, this paper has already occupied sufficient of your time; furthermore, Mr. Camp, of the Canadian Pacific, and Mr. Taylor or Mr. Van Aken, of the New York Central Lines, will be glad, I feel sure, to tell you of the Canadian Pacific duplex circuit between Montreal and North Bay and the proposed Albany-Fonda circuit of the New York Central Lines.

The paper was received with applause.

PRESIDENT CHENERY: The interesting paper of Mr. Chetwood is before you, but it occurs to me, inasmuch as we have another paper practically on the same subject, it might be well to have the paper of Mr. Van Aken, of New York City, after which the discussion of both will be in order. We will be glad if Mr. Van Aken will present his paper. "Maintenance and Operation of Telephone Service on Railroad Company's Lines."

A comparison of the maintenance and operation of telephone service on railroad companies' lines, with the maintainance and operation of telephone service on telephone companies' lines, is necessary to a proper understanding of the subject under consideration.

The telephone company's maintenance force consists of Plant Superintendent, Division Plant Superintendent, Wire Chiefs, Battery men, Switchboard maintenance men, local trouble men, instrument installers, linemen and an Engineering Department in an advisory capacity; while the railroad company's maintenance force consists of the Superintendent of Telegraph, with possibly an assistant, Wire Chiefs whom he has picked from the rank and file, and educated for the work in connection with their other duties; telegraph companies' linemen, and, where a contract with the telegraph company does not provide that their men shall take care of inside work, the Superintendent of Telegraph may have authority for one man to each one hundred and fifty miles of line, who can be called upon to work on telephone line test panels, and office equipment, under his personal supervision, or that of his assistant; and in some cases, the Engineering Department of the American Telephone & Telegraph Company in an advisory capacity.

A telephone company's operating force consists of a President, Vice President, General Superintendent, Superintendent, Manager, Traffic Manager, Chief operators, Supervisors, Repeating clerks and Line operators; while the railroad company's operating force consists of the Superintendent of Telegraph, Wire Chiefs and Switchboard operators.

Telephone companies maintain their apparatus and lines by men assigned to particular branches ,while a railroad company having but one, or possibly two, long distance circuits, maintain the lines, and office equipment, with men who have various duties to perform.

The telephone companies have officers directly in charge of the maintenance and operation, who are interested only in telephone work, to the end that the service be maintained satisfactorily, not only to a few, but to all concerned; while the railroad companies switchboards are usually under the jurisdiction of local officials, who have other important branches of service to look after and do not realize the needs of the general telephone situation nor give proper attention to complaints of poor service, at the same time they themselves get the best of service due to the fact of their relation to it at that particular point.

Telephone companies linemen report to their wire chiefs every hour, whether on trouble orders or inspection trips, and are not allowed to leave their stations without orders or permission. They have territories ranging from six and not to exceed eighteen miles, being located as conveniently near the center of their respective sections as possible. Repairs are not made by them, but are reported to their foremen, as they are not expected to go further than to keep the wires in actual operating condition; while the railrooad company's lines are maintained by telegraph companies men whose territory will vary from thirty to sixty miles. When at outlying points they have no means of communicating with their wire chiefs, and frequently from one to five hours will elapse after trouble is reported before they are notified of it. In the absence of wire trouble, they are usually making repairs to the line, putting on guys, crossarms, guard wires, insulating, and in fact everything that can be done single-handed.

The wire chiefs of the telephone companies are in touch with their linemen and issue orders direct to them, while the railroad company's wire chiefs (except where they are joint men), are obliged to report trouble to the telegraph companies and they in turn send men out to clear it.

Telephone companies can economically maintain a large force of men to look after their larger plants, while railroad companies with but one, or possibly two circuits, could not consistently maintain a similar force, as the expense of doing so would be excessive and entirely out of the question.

Telephone companies lines are invariably constructed along public highways or on private properly where tree trimming privileges cannot be obtained, in consequence of which their standard minimum insulation is ten megohms per mile in clear weather. The insulation resistance of open line wires, on railroad companies lines will, in clear weather, show as high as sixty or seventy megohms per mile. The reason for this is that railroad companies lines are on their right of way where there is seldom any question regarding trimming rights and privileges; and thus a high standard of insulation, which is essential to good transmission can be maintained.

The practice of utilizing Wheatstone bridge measurements to locate trouble on telephone companies lines, is not employed effectually at long range on account of distributed leakage. Numerous testing points are, therefore, essential, being located on an average of every five miles, while on railroad companies lines, they are located on an average of every twenty miles and the Wheatstone bridge measurements are here effectually employed at long range, and trouble located where a high standard of insulation is maintained, the results of such tests being seldom more than three or four ohms at variance.

As parallel circuits are seldom available to patch out on railroad companies lines, it is needless to say that in case of interruption, communication cannot be restored until the cause has been removed; while on the other hand, telephone companies have various routes over which to switch their business in case one should fail: They also have parallel circuits with which to patch their most important circuits, and it is not as essential for them to hasten repairs, as it is where similar conditions do not obtain.

To siccessfully operate a long distance telephone circuit on a railroad company's line, the most important requisite is a Monitoring Wire Chief whose good judgment can be relied upon. It is also essential to have wire chiefs who are both telephone and practical railroad men, and a set of fixed rules that are comprehensive and definite.

The monitoring wire chief's duties can be summarized as follows:

He should watch the lines closely for any irregularities in the service, such as line trouble, noisy connections or, unlawful use of the lines. He should see that employes are attentive to duty, that the rules and instructions for the operation and maintenance of the service are complied with, that employes are courteous in the performance of their work, and that all calls are promptly and properly establish and, no partiality shown in the matter of precedence to esetablish connections. He should assist in any lawful way to accelerate the service, establish morning test calls and, whenever necessary to improve transmission, place telephone repeaters in the line and, see that they are always in good condition. He should be responsible for the prompt clearing of the line of all switchboad connections on through calls, test the line to ascertain positively whether all switchboard connections, simplex coils, bells, etc., have been removed, and the line connected through at test boards and test panels before establishing the connection. He should keep a complete record of all interruptions and trouble on the line and inform the Superintendent of Telegraph promptly of such interruptions or trouble, and advise him when communication is restored. He should check the standard of insulation and resistance of the entire line at least once each month, supervising the work of other wire chiefs, who are expected to manage the offices at which they are located while at the same time they have other duties equally distracting from this particular line of thought and work.

Wire chiefs should be located at division terminals if possible, as is also the case with the monitoring wire chiefs. The latter, however, must be located at telephone repeater stations where repeaters are used, and these stations should be equipped with every convenience for the proper handling and supervision of the service.

The telephone set on a monitoring board should be equipped with a high impedance receiver so that the monitor can remain in on connections without noticeable loss in transmission; and, if a small switchboard is necessary at such a point for switching long distance connections, he should, to be in close touch with the operators and operation, handle it personally, when on duty, and closely watch the nature of the business transacted.

Where a contract exists between the railroad company and the American Telephone & Telegraph Company, stipulating that the use of their equipment and the establishment of connections from points on private lines through their switchboards is for the exclusive use of the railroad company and the transaction of its business, calls relating to private matters must not be allowed and should be immediately cut off and the parties involved notified that they cannot use the line for private business. This should be done, not only to carry out the spirit of the contract, which is sufficient cause for arbitrary action, but to insure the prompt transmission of railroad matters.

Unless this or some similar plan is adopted, calls covering private matters will creep in, operators will discriminate in favor of certain parties, allowing them to use the line in excess of the time limit, in consequence of which, waiting calls will be unnecessarily delayed, and oftentimes the line will be held idle to establish a certain call; whereas, if it is known that a strict supervision is being maintained, this will not occur.

When there is a congestion of calls between two stations. operators will often insist on holding the line for more than a reasonable length of time, and calls waiting on other sections of the line would be delayed for hours and, if the monitoring chief is not authorized and empowered to settle disputes and questions between operators and those using the service, the situation will immediately become chaotic. One of the most important duties of a monitoring wire chief is to see that all stations have equal opportunity to establish calls.

The operating rules of telephone companies are compiled with a view to furnish the best possible service over their lines at fixed toll rates; in other words, they are in the business from a financial standpoint; and, if the service so furnished is not satisfactory, the only inconvenience they experience is that of financial loss.

The rules to govern telephone service on railroad companies' lines are compiled to furnish the best service possible with limited facilities, and to transact a maximum amount of company business.

Company business defined, relates to matters that strictly belong to the operation and maintenance of the railroad or are of interest to the railroad company; in other words, official business, which must be transacted without delay.

The demands of official business on one long distance circuit are so great, that all unimportant matters, as well as private matters, must be eliminated; as otherwise, the congestion of the service would be unbearable. If conductors, engineers. brakemen, firemen and all others not directly connected with the operating department were allowed to make use of the limited service, it would be next to impossible to transact important business; and then again, their communications usually consist of personal grievances which the division officials do not care to discuss by telephone, it being detrimental to good discipline, and they are adverse to allowing employes such privileges.

To meet the demands of the service as far as possible, and transact a maximum amount of business, it will be found necessary to limit calls during office hours to three minutes, excepting those made personally by certain company officials, whose communications should be unlimited. In order to protect unlimited service calls, a list of those entitled to unlimited service and precedence should be compiled and embodied in the fixed rules.

On the New York Central Company's line between New York and Buffalo, and the Lake Shore Company's line between Buffalo and Chicago, precedence and unlimited service are accorded to the President, Vice-Presidents, General Managers, Assistant General Managers, General Superintendents, Superintendents of Telegraph, (who are responsible for the service) and Chief Engineers. These officials authorize the symbol "39" when they require immediate service, upon receipt of which, telephone operators proceed to clear the advance line of all limited service calls, and immediately establish the "39" connection.

When calls are made personally by the above named officials without authorizing "39," they are handled as "Specials," i. e., they are established next after the completion of any call or expiration of a time limit.

Immediately after the expiration of unlimited service calls, the connections that were cut off to establish them are re-established.

On account of the lines referred to being used for both short and long haul connections, the direct New York-Chicago circuit is connected into nine private branch exchanges, and at each of these points, the line is bridged with 2,500 ohm bells; and, to operate Morse over the New York-Buffalo section, the line is equipped with six No. 37-A repeating coils. The impedence offered by each of these coils is equal to about 40 miles of No. 8 B. W. G. open copper line metallic circuit.

It was impossible to obtatin good transmission on the line "bridged" with bells at seven intermediate stations, and with approximately the equivalent of two hundred and forty miles of additional circuit, due to the repeating coils; therefore it was necessary to inaugurate a system to quickly clear the line of everything that would impede transmission, as follows:

The signal symbol "39" is authorized by operators and wire chiefs on all calls between points on the New York Central lines, and points on the Lake Shore lines exclusive of Buffalo. The operator at the originating station immediately clears the advance line of limited service calls, and passes the symbol, naming destination, to the advance station, and then notifies the home wire chief. Operators at intermediate advance stations immediately clear the advance line, relay the symbol and notify their wire chiefs of the "39" connection. The wire chiefs so notified, immediately acknowledge the symbol call notice to the monitoring station, and connect the line straight through at the line jacks. As soon as the monitoring wire chiefs are in communication on all New York-Chicago calls it requires about thirty seconds to test the line between Ravena, N. Y., and Elkhart, Ind., a distance of seven hundred miles, to see that it is absolutely clear of all office equipment. If they find that some one has failed to connect the lines straight through, which is very seldom the case, it may take an additional one minute to remove the remaining equipment. Assuming that the line is found to be clear, they immediately notify the originating and terminating stations to proceed, and at the same time insert the telephone repeaters in the line. To follow these instructions to the letter, and establish a call between New York and Chicago covers a period of about six minutes, and the quality of transmission is dependable.

Reviewing what has been said with regard to establishing through calls on our New York-Chicago circuit, it will be seen that all difficulties due to the "bridging bells" has been removed, that the line has been shortened, approximately, two hundred and forty miles, by the removal of the simplex coils, and, as the two sets of telephone repeaters are equivalent to three hundred and sixty miles gain in transmission, that the total of nine hundred and seventy railroad miles is reduced to six hundred and ten open line transmission miles.

After a through "39" call is completed, the monitoring wire chiefs (who are monitoring the service at the repeaters), immediately notify all intermediate wire chiefs, by Morse, that the line is released from the through service. The intermediate wire chiefs watch a designated wire until the notice of release is received, whereupon they connect all equipment normal and notify their switch board operators accordingly. The telephone circuit is invariably cleared and placed in local service in the insignificant period of thirty seconds.

Referring to the local operation of the line that all stations may have equal opportunity to establish calls, a ruling is enforced that no two stations, under equal conditions, shall be allowed to hold the line to establish more than six calls or for a time period of thirty consecutive minutes. Unless the use of the line is so limited, it would be impossible to transact business between all points, without protracted delays at one point or another.

From the above comparison of the maintenance and operation of telephone service on telephone companies' lines with an experienced adequate force in each of it's branches, and the maintenance and operation of telephone service on railroad companies' lines with a force who have combined duties to perform, it will be seen that the latter is a complex proposition.

Telephone service on the New York Central lines was proposed in 1902, authorized in June, 1903, and the line construction completed December 3d, 1904; but the quality of transmission obtained between New York and Chicago was very unsatisfactory up to August, 1906.

Established precedent in the operation of the line was the principal cause for much of the confusion and difficult transmission experienced previous to this date; the radical departure outlined above has brought about the present satisfactory conditions.

Good results can be anticipated by operating similar lines in a like manner, as some of our people are of the opinion that the transmission and service over the railroad companies' private circuit between New York and Chicago is twenty-five per cent. better than can be obtained between the same points on commercial lines.

The paper was received with applause.

Mr. Williams: If there are any other papers on the same subject I ask that we have them read and discuss them afterwards.

President Chenery: I believe they are the only two papers on the telephone question. A great many of the members are interested in this matter of telephone service on railway lines. On the road I represent our people have thought they would like to connect the general offices with the larger terminals and division offices. We haven't as yet found the money. An account of the efforts of the N. Y. Central people, who are the pioneers, perhaps, in long distance railroad telephony, will be beneficial to the balance of us when we reach that point. The two papers are now open for discussion.

Mr. Selden: I have anticipated that sooner or later the telephone service must come. I suggest that it might be well to bear that in mind. It wouldn't cost much more if you never used it. There is a sort of reciprocal arrangement, not only for cables, but office equipment, and I am satisfied the telegraph company would be glad to meet you on that point, because I have known of their doing so already. I do not think that the W. U. now order any cables but what contain a number of pairs of telephone circuits.

Mr. Camp: I might say in response to Mr. Selden's remark that the point is well taken. We have a number of composited telephone circuits, and in order to overcome the induction we have had to put up aerial twisted pairs between the telegraph office and the general offices. We are now putting in another cable with twisted pairs to provide for telephone circuits or circuits on which we work the telephone.

Mr. Rhoads: On a N. Y. C. line they operate thirty-seven miles of road, with an average of thirty-six trains a day, by telephone without any operator, having the phones where the train men can take their own orders. Possibly some A. T. &T. man here is familiar with that. Regarding the question of joint cables, I think, personally, the telephone is of such importance that we should have separate cables, so in case you have lightning trouble on one system it does not mix with the other. You always have one clear.

Mr. Groce: We constructed the Indianapolis Southern using the telephones for handling trains, and we did not have any trouble in six months, but in that period there had been several quite serious accidents in the United States and the management were getting a little scared. While we felt it was safe, we felt it was a new departure. We were severely criticised and for that reason we changed to the telegraph. With the telephone system the Illinois Central has had some experience as long ago as 1901, I think. We had nearly a thousand miles of metallic circuit. They changed the line on one division, seventy-five miles, to telegraph. In going over the whole situation some time ago it was suggested the line might be improved by making an arrangement with the Bell Company to take our lines into their boards. The telephone company having facilities for testing, etc., could better handle the lines and could better certain parts of the service, and it would do away with the necessity for our having many high-priced men. Before I came away the arrangement had almost been completed.

President Chenery: It might be interesting to the members, as we all have in mind the use of the telephone on some branches, if you would specify the distance of this Indianapolis Southern, how many stations, etc.

Mr. Groce: The line is eighty-nine miles. Regular train service was carried on between Indianapolis and Bloomington, Ind., about fifty-six miles. There were a great many work trains, and as you know, work train service makes a good many train orders. There were a number of orders handled every day, and handled precisely as by telegraph. The despatcher had a telephone on his desk. We fixed him up with this arrangement you tie over your head, so he could keep up his train sheet, give his orders and all the information that would come from a despatcher, and it worked all right.

President Chenery: How many stations?

Mr. Groce: I think, five stations between Indianapolis and Bloomington.

President Chenery: Were your agents at these points telegraphers? Had they been accustomed to handling train orders by telegraph?

Mr. Groce: Most of them had; yes, sir.

Mr. Taylor, A. B.: How long in operation?

Mr. Groce: I think we operated it about six months.

Mr. Ryder: We were constructing a line about sixty miles long and the original plan was to use the telegraph but before we got ready to start in the suggestion was made that we try the experiment of using the telephone, and that experiment was continued not only during the building of the line of the road, but for nearly a year afterwards. Mr. Groce referred to the amount of work, train orders, etc., resulting from work train service. We all realize what that means. We used the telephone and never had a particle of trouble and handled everything from train orders down. It was finally found advantageous by reason of local conditions to operate this piece of line telegraphically instead of telephonically, this change doing away with the telephone dispatchers otherwise necessary. In making the change the new line, which was over a hundred miles from division headquarters, was simply hooked on to the old telegraph line to headquarters, making the telegraph dispatching circuit simply that much longer. This change was dictated entirely by economical reasons, not by any dissatisfaction with the scheme of telephone operation..

President Chenery: In your opinion, do I understand, Mr. Ryder, on branch lines you see no objection to handling trains by telephone?

Mr. Ryder: I certainly do not, if you have a first-class telephone circuit; none whatever.

Mr. Camp: The Canadian Pacific is now doing some construction work, and during construction communication is kept up by telephone. We have work under way of 220 miles, and in all cases we are using two wires put up for telegraph purposes as telephone circuits during construction. I believe they give every satisfaction. But we haven't got to the point of using telephones in the operating department, although our vice-president is very much interested in the work and has before him the proposition of converting several branch lines into telephone operation.

President Chenery: I think the experience of us all is on the same line. We have in the past few years built a number of miles of railroad, and, as Mr. Camp stated, in all cases we used the telephone until turned over to the operating department. We, however, were not so fortunate as to have two wires in all cases. We were satisfied if we got the one and used a grounded circuit.

Mr. Cellar: I see Mr. Ryder is trying to get out, and I want to ask him before he goes to what extent he blocks trains by telephone on the Burlington.

Mr. Ryder: During the past two years and a half the Burlington has done a good deal in the way of block signaling and has used the telephone exclusively as a means of communication in that service. Recently we have abandoned the telegraph on our old block circuits and now use nothing but the telephone for such communication.

Mr. Davis: I want to ask Mr. Ryder, do they do it on the main line or does this apply only to yards and branches —short distances? I want to know whether there is any instance where the telephone arrangement takes care of high speed movements.

Mr. Ryder: The service I mentioned covers the main line east of Lincoln, and covers all classes of service.

Mr. Selden: I understand they block entirely by telephone outside of Boston.

President Chenery: I will ask Mr. Kaiser, who is familiar with the question, to explain it.

Mr. Kaiser: All trains a distance of eleven miles outside of South Station are handled by telephone. The last figures I had from the Ast. General Superintendent, showed they were handling 780 passenger trains in and out of South Station daily, or a total of 1,800 passenger and draught trains running out of that station, and that includes the N. Y. N. H. & H. and the B. & A. Between 5:15 and 6:15 there is a total of 90 trains in and out. All of which are handled by telephone.

Mr. Rhoads: By looking at the Railway Guide you can readily see that the movement of trains by telephone is nothing new. I presume between now and the afternoon session you can see how many miles are operated by telephone in the United States, in distances ranging all the way from nineteen to one hundred and twenty-five miles. The impression we started in with that the telephone arrangement for handling trains is something new and experimental, I think is a wrong impression. The first thing the Chicago & Ind. So. did was to arrange for a metallic circuit for a telephone system to operate their work trains while building the road.

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Mr. Selden: That committee could serve in that capacity. I should think it right in line with what the committee was appointed for.

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Mr. Chetwood: The work we have been doing for the New York Central lines consists in designing a special combination of transmitter and receiver, mounted on a specially designed arm, such that a tower man when receiving a telephone message from the train dispatcher does not have to place or hold a receiver to his ear, and therefore has both hands free to write down orders, and also when leaving the telephone set he does not have to remove a head receiver or hang up an ordinary receiver. The receiver itself is a specially designed one to meet the requirement that as large a number as twenty tower sets may be bridged on one circuits and all sets receive satisfactory transmission. In other words, the receiver is one of high efficiency and also one that does not introduce a large transmission loss when bridged across the circuit. Besides the above, we worked out the circuit wiring to be used at the towers and at the train dispatcher's office, the wiring at these places being designed to meet the requirements and conditions which Mr. Taylor and Mr. Van Akin specified. The apparatus referred to above has been about completed, and will shortly be installed between Albany and Fonda, where there are, I believe, approximately twenty towers, and a practical test of this apparatus for train dispatching will then be made.

Mr. Cellar: May I repeat my question to Mr. Ryder as to whether he finds any difficulty in the matter of slow action of the telephone block?

Mr. Ryder: No, sir; we do not.

Mr. Groce: In connection with the special instruments designed for the N. Y. C., our experience has been that there is an advantage in getting away from the desk set; that is liable to fall over and break, and I would suggest that any kind of a device that is more liable to be fixed has an advantage over the movable phone. I imagine they have made that suggestion. I understand that has been done. It may be that they can get some device directly that will do away with the operator and solve this vexed question of scarcity of men.

Mr. Taylor, J. B.: In my experience when talking to or from a telephone in a signal tower, when I started to talk somebody would say: "Wait a minute until this train passes." Considerable time is lost that way. I want to ask if external noise is much of a factor in the use of the telephone for block working.

Mr. Van Akin: We have arranged to put in automatic cut-offs, so no noise can get in.

Mr. Camp: Referring to the arrangement for cutting off transmission, why not have this little switch operated by the foot? We have a telephone in our operating room, for convenience on the chief operator's desk, and in order to prevent noise interfering with his receiving we have a small floor button on which he places his foot when listening.

President Chenery: I would suggest this afternoon, in addition to some papers, the writers of which are present, that we take up—perhaps, it would be advisable to first take up the report of the Committee on Wire Legislation, of which Mr. Groce is chairman. This matter was the foundation for our monthly meetings in Chicago and St. Louis. While we have been successful in securing legislation covering wire crossings in some states, the field is not yet fully covered. We want to thresh that matter over thoroughly. I believe Mr. Groce is prepared to make his report.

Mr. Rhoads: In looking over the figures in this guide (Railway) I find there are now 4,757 miles of roads now operated by telephone.

President Chenery: Certainly interesting information.

Mr. Rhoads: Of course, some are electric lines, and where they have trains at least every hour handled by telephone.

Mr. Camp: I might say in the first place it was principally through the kindness of the railroad department of the Bell Telephone Company that we have been able to successfully operate our circuit. The conditions are these: Amongst other wires on our overland system we have two and that experiment was continued not only during the building of the line of the road, but for nearly a year afterwards. Mr. Groce referred to the amount of work, train orders, etc., resulting from work train service. We all realize what that means. We used the telephone and never had a particle of trouble and handled everything from train orders down. It was finally found advantageous by reason of local conditions to operate this piece of line telegraphically instead of telephonically, this change doing away with the telephone dispatchers otherwise necessary. In making the change the new line, which was over a hundred miles from division headquarters, was simply hooked on to the old telegraph line to headquarters, making the telegraph dispatching circuit simply that much longer. This change was dictated entirely by economical reasons, not by any dissatisfaction with the scheme of telephone operation..

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Throughout the middle east, parts of the Ohio Valley and in other localities, the Chestnut is plentiful, and has quite a long life in contact with the soil. Its form is not nearly so perfect as the White Cedar, but it far exceeds the latter in strength to withstand lateral stresses, although its length of life is inferior to that of the Cedar, except, perhaps, in the regions where it is native.

On the Pacific Coast, sawed red-wood posts have been and are still in use; and in Mexico various timbers are utilized, the process being to cut a piece of timber with rectangular section, diagonally along its broad side, from near one side at the one end to near the other side at the other end, making of such section two posts, each of large base and small top. This form of support has also been used in the construction of steel supports, by halving I-beams in the same manner.

The Northern Cedar, as a proposition for the supply of the immensely extended telegraph, telephone, light and power lines, has passed the safety line as a resource. The Western Cedar, of which there are immense quantities, is so far away that the transportation charges make the price per pole almost prohibitive for ordinary purposes. The Chestnut, considered as a supply for its native region, is to be depended upon for the immediate future, but is sadly inadequate as a supply for the whole country. Therefore, the mind instinctively turns to a manufactured article which shall take the place of the natural, and the logical time when the manufactured product shall so take the place of the natural is when the former can be produced as cheaply as the latter.

Into the question of cost enters that of length of pole life. Heretofore, the advisability of using a wood preservative to reduce or prevent the decay of the wooden poles has been considered from time to time, but the practice has not been largely established, because

(1) The pole prices have been very low.

(2) The increased life has not been found to be commensurate with the additional expense of treating the pole in its entirety.

(3) In the building of many lines, the outlook has contemplated only moderate increases in facilities, whereas, in many instances, time has demonstrated that very much larger poles soon or later become necessary, and, therefore, the process of detioration only serves to take down many small lines that would have to be taken down anyhow, in order to make room for larger-capacity poles.

The principal point of decay in wooden poles is at the ground and air line, where the alternate drying and dampening induces a condition of decay which grows and grows and frays away the body of the pole until it is so weakened that it has to be reset or replaced. On the lines of railroad along which a great proportion of the telegraph lines of this country are located, the unoccupied portions of the rights-of-way are kept in turf, with a view to presenting the best possible appearance, and, consequently, are subject to grass fires, especially in dry seasons, which are dangerous to standing dead timber, particularly to telegraph poles where the decayed portion at the ground line has become like tinder. Were it not for the increased liability to ignition, the application of coal-tar to the poles, for a sufficient distance above and below the ground and air line to resist the inroads of decay, would materially lengthen the life of the pole and, while this process is all right in sandy, desert countries, the grass fires in other territory preclude its general use.

Having the solution of the question of pole preservation much at heart, the writer, through the courtesy of the gentlemen of the Engineering Department of the Pennsylvania Lines west of Pittsburgh, some years ago made some rather comprehensive investigations into the matter of a preservative best suited for telegraph pole uses, and, casting aside the proposition to treat the whole pole as too expensive in proportion to the benefit thus derived, we decided (on account of the short time until certain construction work had to be statrted) to undertake a compromise, by applying the preservative only to that portion of the pole extending one and a half to two feet on either side of the ground and air line. That the result justified the expense, is borne out by the present condition of the poles so treated as well as by the result of the experiments by the Forest Service, Department of Agriculture, shown in the report by Mr. Henry Grinnell, Assistant Forest Inspector (reprinted from the Year Book of the Department of Agriculture for 1905), on prolonging the life of telephone poles, and describing the experiments in several methods of treatment, from which he adduced the conclusion that, while the lapse of time since the applications were made had not been sufficient for a full report, the method of treatment, consisting of applying the preservative to the pole by brushes, was so cheap that it would certainly repay its cost by an increase of only eight months in the life of the pole. I had not until recently seen this report, and did not know of the experiments, but, confirming, as it did, the results of my own trials, I feel encouraged to think that, under present price conditions, so long as we continue to use poles of wood, we shall certainly find in the increased life of the pole ample remuneration for similar treatment with any good preservative preparation, and especially one of antiseptic qualities.

The foregoing tends to show that the comparative price of the native woods with that of the manufactured pole is subject to considerable of a sliding scale, as the life of the wooden pole is of short duration, as compared with the estimated life which a manufactured article of perfect proportions should have.

In looking to a product which shall be the acme of structural possibility, the object will be to secure an architectural fabric that will last forever, and a Pittsburger instinctively feels that the first and best medium for the manufactured article will be steel. But consideration develops that the length of life of steel, without adequate preservative agencies, is not much greater than the long-lived woods. A great many patterns of steel poles have been made, but probably very few of them represent our practical desideratum. Among them are the poles cut from I-beams, referred to above; tubular poles made of pipe jointed together; tubular poles of special design and manufacture; poles made of plates bolted together; poles of angles fastened together by lattice-work, and sundry other forms. But thorough study of the matter brings the conclusion that, to have sufficient long life for consideration, the inside as well as the outside of any steel pole open to the air must be accessible for the purpose of inspection and reapplication of preservatives.

So far as the writer has ascertained, the preservation of steel imbedded in properly constructed concrete is perfect. Concrete not only does not disintegrate, but hardens and improves with age. Therefore, a structure of reinforced concrete has a life that is practically unlimited, and a telegraph pole made of reinforced concrete ought for many generations to endure and answer the purpose for which it is erected. The location of pole lines along railroad rights-of-way will in the future permit the use of shorter poles for supporting the wires nearer the ground than has been practicable heretofore, because the rights-of-way of the railroads are better policed now than in the past, and in the future will be much more safely guarded. The time will soon come when persons not employed on the railroads, or whose duties do not require them to be on railroad property, will not be allowed on the rights-of-way of any railroad company. In England and on the Continent, where trespassing is not permitted, it is the practice to use very much shorter poles and place the wires nearer the ground.

The use of concrete for the manufacture of telegraph poles is not new. As nearly as I have been able to ascertain, the first concrete poles were designed by Col. G. M. Totten, Chief Engineer of the Panama Railroad Company, at a date uncertain, but probably about 1856, the road having been put into operation in that year. These poles were coneshaped, twelve feet long, with a diameter of from twelve to fifteen inches at the base and from six to eight inches at the top. The wires were supported by iron brackets, which were fastened to the poles by wrought iron bands passing around them and around the poles near the top. The proportions of the ingredients used in the manufacture of these poles is not obtainable, but the strength to resist strains was so inadequate that means were sought to overcome this fault, and the poles were a few years later replaced from time to time by the first reinforced concrete poles of which record is known, the reinforcement consisting of 3x3 inch pine cores, extending throughout the length of the poles. The concrete poles, it is understood, were used because the available wooden poles were very short-lived, by reason of the ravages of insects. The poles with wooden reinforcement evidently were not attacked by the ants soon enough to prevent the cores from swelling and cracking the concrete, so that the first pattern of reinforced poles was not an appreciable improvement over the solid pole. After being used for a few years, the disruption of both classes of poles was such that they were practically abandoned, they having been replaced as occasion required by other patterns until, in 1888, there were only about twenty of the original poles standing, one or two of which still remain erect on the line of that road.

The "Geological Survey of Ohio," 4th Series, Bulletin 2 (1904), entitled "Uses of Hydraulic Cement," by Prof. Frank Harvey Eno, of the Ohio State University, presents in an article entitled "Cement Telegraph Poles," an item of some interest, describing cement butts for wood poles that have rotted off, observing that when a pole has to be replaced, often only the part setting in the ground has deteriorated, and, while in some country districts the pole may be cut off and reset, there are many poles that must be replaced altogether, thus losing the most of the pole. To meet this contingency, a cement base has been devised, octagonal in shape, with four iron strips bolted to opposite faces, extending a foot or more above the concrete. In installing this concrete base, the rotten pole is sawed off, the lower end swung a little to one side, the cement base put in the place of the rotten stump and the pole is then swung into the socket formed by the iron strips, and securely bolted. The pole when thus equipped is alleged to be better than new. In restumping in the manner just outlined, no wiring need be touched nor telegraph communication interfered with in the least. Another feature of the use of these cement butts is, that when a pole has deteriorated beyond the point of usefulness, and has to be replaced, a pole five feet shorter can be furnished, thus materially reducing the cost. The above-mentioned article states that these butts had been in use for three years, and were giving good satisfaction. The practice of restumping is largely followed in the present day, except that stumps of wood are used instead of those of concrete.

The "Cement and Engineering News," for August, 1902, mentions with strong approval the cement butts manufactured at Battle Creek, Michigan, giving about the same points stated above, and estimating that a saving of from thirty-five to fifty-five per cent. is realized by the use of these butts in reconstruction.

Mr. Robert A. Cummings, Member A. S. C. E., a Consulting and Constructing Engineer, with offices in Pittsburgh, Pa., made, in 1903, some experimental concrete telegraph poles at Hampton, Va., and found them to be quite satisfactory for ordinary purposes. The cross-section was that of an equilateral triangle with 12-inch sides at the bottom of the pole and 6 inch sides at the top. The poles were thirty feet long, and were reinforced with three-fourths inch vertical rods at the corners. They were stiff enough to support their own weight a span of about twenty feet. At that time, Mr. Cummings had not seen any concrete poles in actual use, but said he had designed some large distributing poles for the New York Telephone Company.

Mr. McDonald, Chief Engineer of the Nashville, Chattanooga & St. Louis Railroad Company, wrote, under date of January 22, 1906, that he had used concrete poles five inches square at the top and eight inches at the bottom, thirty feet long, for supporting warning straps; or ticklers, and that they have given such satsifaction that he has adopted them as standard for that purpose. The most satisfactory results were derived from these poles by attaching pipe cross-arms, and no deflection at the middle ordinate of the pole was discernible.

The United Electric Railways Company of Baltimore has used cement trolley-poles with good results.

Mr. Alexander Crawford Chenoweth, of Brooklyn, made in 1906, some cement poles sixty feet long and fourteen inches in diameteer, calculated to withstand a direct pull of eight tons and a torsion from a yard-arm four feet long equal to four tons. These poles, erected in place, cost two dollars and a half a foot. They were built to carry a four inch cable, high power direct current transmission, the spans being five hundred feet.

Mr. J. B. McKim, Superintendent of the Western Division of the Pennsylvania Lines West of Pittsburgh, made and set up last year in the line along the Pittsburgh, Fort Wayne and Chicago Railway near Maples, Indiana, fifty-three concrete poles of very graceful proportions, in which the method of reinforcement used differs essentially from any other of the poles referred to herein. These poles are small in section and approach the minimum in weight. They have thus far given entire satisfaction and show no evidence of decay.

A notable example of recent construction of a pole of mammoth proportions is that of the reinforced concrete tower for the West Penn. Railway Company's transmission line spanning the Monongahela River at Brownsville, Pennsylvania. This structure, which is one hundred and fifty feet in height, supports cables through a span of one thousand and fourteen feet, crossing the Monongahela River. The cables are attached at an average height of a hundred and five feet from the base of the pole, which is backed up by a shorter structure of the same construction, used as an anchorage tower. Both towers were designed as cantilever beams, and are mentioned as examples of how these erections are extending. The details of construction are outlined by Mr. F. W. Scheidenhelm in the issue for May 2, 1907, of the "Engineering News," who designed and constructed the towers.

After a somewhat extensive series of experiments made some time since, Mr. J. L. Weller, Member of the Canadian Society of Civil Engineers, and Superintending Engineer of the Welland Canal, built and erected a power line along the Welland Canal, using reinforced concrete for the manufacture of the poles. The poles in this line stand from forty-five to seventy feet in height, and were designed to withstand a horizontal pull at the top equivalent to two thousand pounds. These poles have been standing in the line for more than three years and are apparently in good condition. I am informed that Mr. Weller also built a line of concrete poles forty to sixty feet in height for the Niagara Falls Power Company, and a line twelve miles long, from Decow Falls to Welland, for the Hamilton Cataract Light, Power and Traction Company, the poles running from thirty to forty feet in height above the ground. Short, heavy stubs are used to carry the line over the gorge at DeCow Falls, and poles sixty-eight feet high carry the span of four hundred feet crossing the Welland River. The latter are erected in the center of square concrete piers on pile foundations, and are capable of standing an immense strain. He also made a pair of concrete poles one hundred and fifty feet in height for the Lincoln Electric Light and Power Company, to carry that company's wires over the old Welland Canal at Lock Three, St. Catharines, Ontario. These poles are eleven inches square at the top, thirty-one inches square at the base, and weigh about forty-five tons each. They were made, not built up from the base like the towers at Brownsville, Pa., above referred to, but horizontally on the ground, and, as is the practice with wooden poles, raised into position. Of course, their extreme height and weight made it necessary to use special apparatus for their erection. Mr. Weller's processes of reinforcement are covered by patents.

Recurring briefly to the relative merits of the reinforced concrete pole as compared with the wooden pole restumped with concrete above referred to, it is thought that, while quite a considerable output of the latter have been manufactured and used, unless some more secure arrangement for uniting the two parts in the restumping process shall be adopted, and one that can be secured at a low cost, this solution of the problem of supplying a substitute for the wooden pole will not be a lasting success. Another point that may be cited as against the use of the stumped pole is, that the greatly increased cost by reason of putting on a sufficiently stable brace, will not be justified by the short additional life secured for an old pole by the restumping process.

Some of the problems confronting the initial manufacture of concrete poles were,

(1 Shall the poles be made of such dimensions as to necessitate a concrete foundation, or of such size and shape that they will be securely held in ordinary earth by thorough tamping?

(2) Shall they be made in a yard and then distributed, or shall the materials be transported to the various locations in which the poles are to stand and the poles be made there?

The experience of late years on all lines of railroad is, that the expansion of track and other improvements have made it necessary to move to new right-of-way lines so many telegraph poles that, in planning for a pole of infinite life, it would be better, if possible, to procure a type which would be secure without the foundation which would render its location when once set up a permanent fixture, and this type would be preferable to the fixed type.

(a) Because of its smaller cost to construct;

(b) Because of its smaller cost to set up in the line, and

(c) Because it will be easily removable to a new location.

The second question was decided in favor of the manufacture of poles in yards, because their construction at the points at which they are to be set involves the transportation to these points of not only the solid materials to be used in their manufacture, and shelter for these materials, but also the water, which is not ordinarily available, and the forms. In fact, a very considerable additional physical property in the crude materials proportionate to the smaller sum total of the finished product.

On busy railroads, construction at the point of setting would involve the assembling of the apparatus on a car, the use of motive power, and the obstruction of the main track to a certain degree. This being the case, the alternate plan does not require any more apparatus or crew, will not require the services of a locomotive and crew as long, or for any longer time than the plan of making the poles at the place where they are to be set up; but it involves in addition, perhaps, the use of a derrick to be mounted on a car, the beam of which shall have sufficient radius to reach the line on which the poles are to be set. The procedure to be followed would then preferably be to manufacture the poles in a yard and have them thoroughly seasoned there before moving. In preparing for distribution, they should each be tagged or otherwise have a designation or location attached to each one, indicating the exact site in which the surveyor or inspector has designated each to be set on account of the necessities for grading the line. The poles should then be loaded by the use of the yard derrick or a derrick car, be taken out by a train, and by the crew of the derrick set up in their permanent places in the line, n holes previously dug for their reception. This plan will require very little if any more obstruction of the main track than the stoppages requisite for the unloading of seasoned cedar poles.

On this basis, we proceeded to make experiments, first in design, and later in various and many patterns. In the working out of the plans for the requisite strength with the minimum of weight, the two hollow poles referred to in detail hereafter were made. The results of the tests are given in this paper as an example of progress, and are not to be taken as the best form for adoption, but quite the contrary. One of the patterns was square in section, with the corners chamfered off; the other, octagonal in section, and the hollow space extending from the base for about two-thirds of the length of the pole, the upper third being solid, and the walls of the lower two-thirds being from 1¾ inch to 3 inches thick. These poles weighed approximately thirty-five hundred pounds, and were calculated to withstand any stress in any direction that could possibly be improved upon them by a line of fifty wires, each wire coated with sufficient ice to make it one inch in diameter. The test was made in connection with two carefully-selected cedar poles of the same length (30 feet), and all were set in concrete, the bases being 3x3x5 feet deep.

Just within the outer surface, the walls of the concrete poles were reinforced with iron rods, which consisted of four three-quarter inch round bars, each twenty-four feet long and four five-eighths inch round bars of the same length. The poles were eight inches in diameter at the top and thirteen inches at the base, having a taper of one inch to each five feet. Galvanized iron steps were screwed into wooden blocks moulded into the concrete, and holes were left for through bolts for supporting the cross-arms. The cross-arm braces were attached to the arms by through bolts in the same manner and fastened to the poles with ordinary lag bolts driven into wooden plugs which were placed in the concrete at the proper places. The concrete poles were set to a depth of five feet in concrete with the two white cedar poles of practically the same dimensions, and, after standing long enough to permit the cement to become solid, they were tested in turn in the following manner:

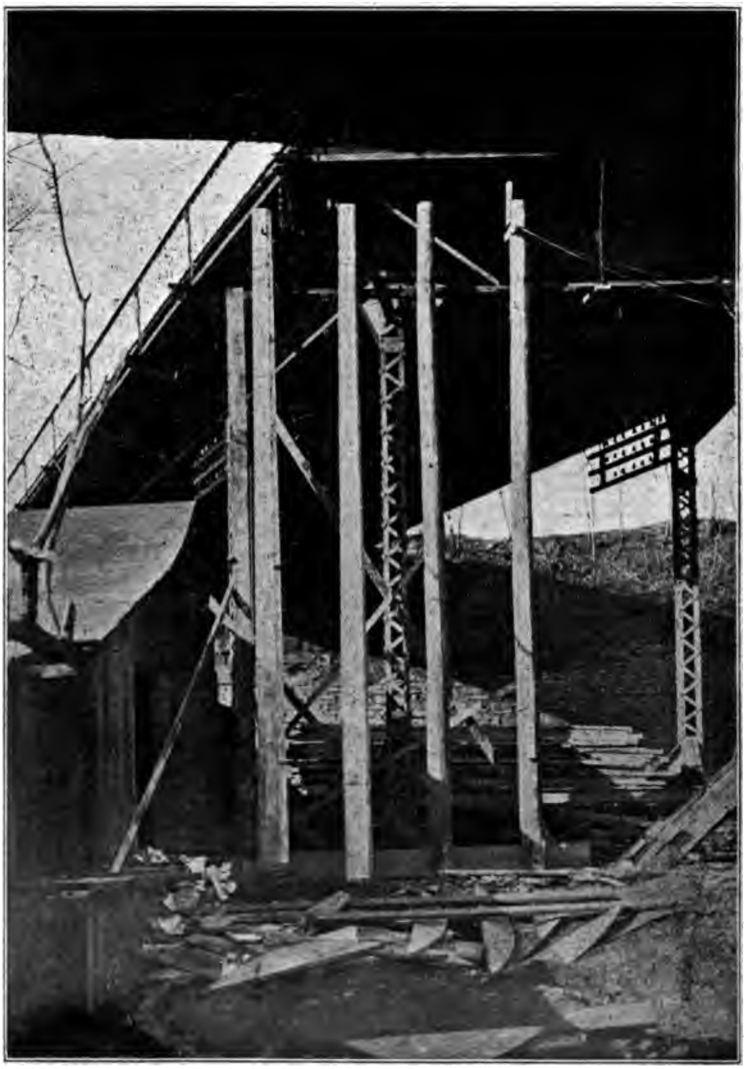
An iron clevice was placed around the pole to be tested ten inches from the top, to which a wire rope was attached, leading over a pulley placed at the same height and at an equal distance from the pole so as to form a right-angle, and fastened to a differential pulley-block which was attached to a laboratory weighing machine.

The results are fully shown in the following tables, and in the accompanying blue prints and photographs.

After the cement poles had been broken, the reinforcement so held them that it required almost the breaking pressure to further deflect them from their slightly inclined position. The wooden poles, under strain, presented the form of an arch before breaking, and when they gave way were fractured completely; but these features were lacking in the cement poles, which were very firm and did not give until they began to crush at the ground line.

The mixture used in these cement poles was 1—3. They were constructed in cold weather, and, through some mischance, at the last moment were unable to get suitable

POLES AS SET.



gravel. Pole No. 1 was found to have a defect in the casting which is believed to be the cause of its early rupture. Pole No. 2 gave a very much better result.

The consensus of opinion seems to be that a 1—2—4 mixture is the best for use in this class of construction, and, while the experiments above were entirely satisfactory in the development of the problem, the hollow pattern is not considered to be the highest type desirable; that is, to combine sufficient strength with the least possible weight, in order to obtain ease in handling, and that the removal from place to place may be readily feasible.

To fulfill these requirements, the pole should be made with a superstructure of somewhat greater strength than the wires which it is required to support, joined to sufficiently added strength by reinforcement and added area in the base, especially at the ground line; and the base should be reinforced in the most effective way to withstand the extreme pressure at the point of fulcrum.

These conditions are all capable of mathematical computation, and if fulfilled, will give a product comparatively easy of manufacture, of reasonable cost, of greater tensile strength than the poles now in use, and extremely high durability.

I am sorry not to be able to go into details in the matter of cost. I do not feel that I can speak with authority as to this feature until their extensive manfuacture be undertaken and completed, or at least until the completion of some further experiments contemplated in the near future.

POLE No. 1. CONCRETE, OCTAGONAL.

Length.	Base Diameter.	Top Diameter.	Depth in Concrete Anchorage.	Distance from Point of Fulcrum to Point of Load.
30 ft.	14 in.	8 in.	5 ft.	24 ft. 2 in.

APPLIANCES FOR TESTING.

TEST No. 1.

Deflection at Top.	Load, Pounds.		Deflection 12 inches above Ground Line.	Time.
3¾ in.	1,830		1/32 in.	3:17
5¾ in.	2,230		1/16 in.	3:18

TEST No. 2.

½ in.	50	Temporary deflection, ½ in.	1/32 in.	
8 in.	2,630		⅛ in.	3:19
11¾ in.	3,030	Crack Nos. 1 and 2.	3/16 in.	3:20

TEST No. 3.

1¼ in.	50	Temporary deflection.	1/16 in.	
14¼ in.	3,430	Crack Nos. 3 and 4.	¼ in.	3:24
18 in.	3,210	Crack No. 5 and crushed bolt.	⅜ in.	3:25
25½ in.	3,150	Pole broke at ground level.	¾ in.	3:26

POLE No. 2. CONCRETE, SQUARE.

Length.	Base Diameter.	Top Diameter.	Depth in Concrete Anchorage.	Distance from Point of Fulcrum to Point of Load.
30 ft.	13 in.	7 in.	5 ft.	24 ft. 2 in.

TEST No. 1.

Deflection at Top.	Load. Pounds.		Deflection 12 inches above Ground Line.	Time.
¾ in.	50			2:02
2½ in.	1,830			2:04
3½ in.	2,230			2:08

TEST No. 2.

¾ in.	50	Temporary deflection.	1 in.	
4 9/16 in.	2,630			2:10
8½ in.	3,030		1/16 in.	2:11

TEST No. 3.

3½ in.	50			
31 in.	3,290			
34½ in.	3,430	Crack No. 1.	⅛ in.	2:14

TEST No. 4.

21¼ in.	50	Temporary deflection.	22 in.	
39 in.	3,690	Crack Nos. 2, 3 and 4. Pole crushed, crack at ground level.		

POLE No. 3. WHITE CEDAR.

Length.	Base Diameter.	Top Diameter.	Depth in Concrete Anchorage.	Distance from Point of Fulcrum to Point of Load.
30 ft.	14 in.	8 in.	5 ft.	24 ft. 2 in.

Deflection at Top.	Load, Pounds.		Deflection 12 inches above Ground Line.	Time.
14 in.	172			
37 in.	2,230			
47 in.	2,530	Pole broke.		11:03

Mr. J. B. McKim, Superintendent of the Western Division of the Pennsylvania Lines West of Pittsburgh, made and set up last year in the line along the Pittsburgh, Fort Wayne and Chicago Railway near Maples, Indiana, fifty-three concrete poles of very graceful proportions, in which the method of reinforcement used differs essentially from any other of the poles referred to herein. These poles are small in section and approach the minimum in weight. They have thus far given entire satisfaction and show no evidence of decay.

A notable example of recent construction of a pole of mammoth proportions is that of the reinforced concrete tower for the West Penn. Railway Company's transmission line spanning the Monongahela River at Brownsville, Pennsylvania. This structure, which is one hundred and fifty feet in height, supports cables through a span of one thousand and fourteen feet, crossing the Monongahela River. The cables are attached at an average height of a hundred and five feet from the base of the pole, which is backed up by a shorter structure of the same construction, used as an anchorage tower. Both towers were designed as cantilever beams, and are mentioned as examples of how these erections are extending. The details of construction are outlined by Mr. F. W. Scheidenhelm in the issue for May 2, 1907, of the "Engineering News," who designed and constructed the towers.

After a somewhat extensive series of experiments made some time since, Mr. J. L. Weller, Member of the Canadian Society of Civil Engineers, and Superintending Engineer of the Welland Canal, built and erected a power line along the Welland Canal, using reinforced concrete for the manufacture of the poles. The poles in this line stand from forty-five to seventy feet in height, and were designed to withstand a horizontal pull at the top equivalent to two thousand pounds. These poles have been standing in the line for more than three years and are apparently in good condition. I am informed that Mr. Weller also built a line of concrete poles forty to sixty feet in height for the Niagara Falls Power Company, and a line twelve miles long, from Decow Falls to Welland, for the Hamilton Cataract Light, Power and Traction Company, the poles running from thirty to forty feet in height above the ground. Short, heavy stubs are used to carry the line over the gorge at DeCow Falls, and poles sixty-eight feet high carry the span of four hundred feet crossing the Welland River. The latter are erected in the center of square concrete piers on pile foundations, and are capable of standing an immense strain. He also made a pair of concrete poles one hundred and fifty feet in height for the Lincoln Electric Light and Power Company, to carry that company's wires over the old Welland Canal at Lock Three, St. Catharines, Ontario. These poles are eleven inches square at the top, thirty-one inches square at the base, and weigh about forty-five tons each. They were made, not built up from the base like the towers at Brownsville, Pa., above referred to, but horizontally on the ground, and, as is the practice with wooden poles, raised into position. Of course, their extreme height and weight made it necessary to use special apparatus for their erection. Mr. Weller's processes of reinforcement are covered by patents.

Recurring briefly to the relative merits of the reinforced concrete pole as compared with the wooden pole restumped with concrete above referred to, it is thought that, while quite a considerable output of the latter have been manufactured and used, unless some more secure arrangement for uniting the two parts in the restumping process shall be adopted, and one that can be secured at a low cost, this solution of the problem of supplying a substitute for the wooden pole will not be a lasting success. Another point that may be cited as against the use of the stumped pole is, that the greatly increased cost by reason of putting on a sufficiently stable brace. will not be justified by the short additional life secured for an old pole by the restumping process.

Some of the problems confronting the initial manufacture of concrete poles were.

(1 Shall the poles be made of such dimensions as to necessitate a concrete foundation, or of such size and shape that they will be securely held in ordinary earth by thorough tamping?

(2) Shall they be made in a yard and then distributed, or shall the materials be transported to the various locations in which the poles are to stand and the poles be made there?

The experience of late years on all lines of railroad is, that the expansion of track and other improvements have made it necessary to move to new right-of-way lines so many telegraph poles that, in planning for a pole of infinite life, it would be better, if possible, to procure a type which would be secure without the foundation which would render its location when once set up a permanent fixture, and this type would be preferable to the fixed type.

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The second question was decided in favor of the manufacture of poles in yards, because their construction at the points at which they are to be set involves the transportation to these points of not only the solid materials to be used in their manufacture, and shelter for these materials, but also the water, which is not ordinarily available, and the forms. In fact, a very considerable additional physical property in the crude materials proportionate to the smaller sum total of the finished product.

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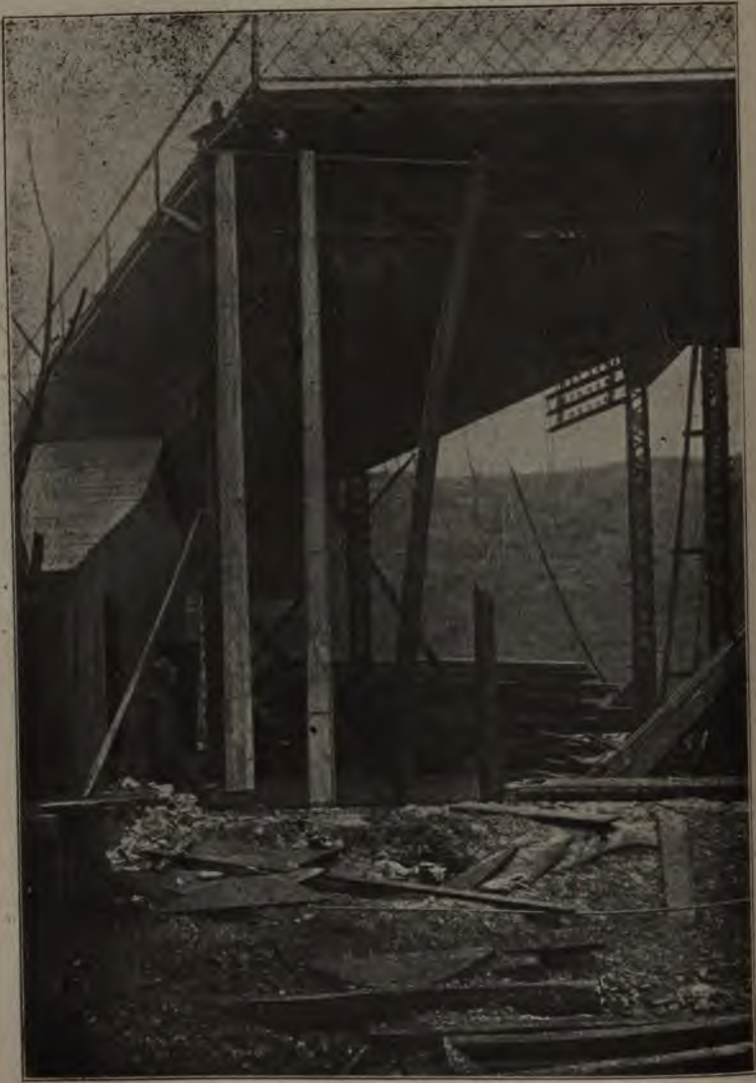
An iron clevice was placed around the pole to be tested ten inches from the top, to which a wire rope was attached, leading over a pulley placed at the same height and at an equal distance from the pole so as to form a right-angle, and fastened to a differential pulley-block which was attached to a laboratory weighing machine.

The results are fully shown in the following tables, and in the accompanying blue prints and photographs.

After the cement poles had been broken, the reinforcement so held them that it required almost the breaking pressure to further deflect them from their slightly inclined position. The wooden poles, under strain, presented the form of an arch before breaking, and when they gave way were fractured completely; but these features were lacking in the cement poles, which were very firm and did not give until they began to crush at the ground line.

The mixture used in these cement poles was 1—3. They were constructed in cold weather, and, through some mischance, at the last moment were unable to get suitable

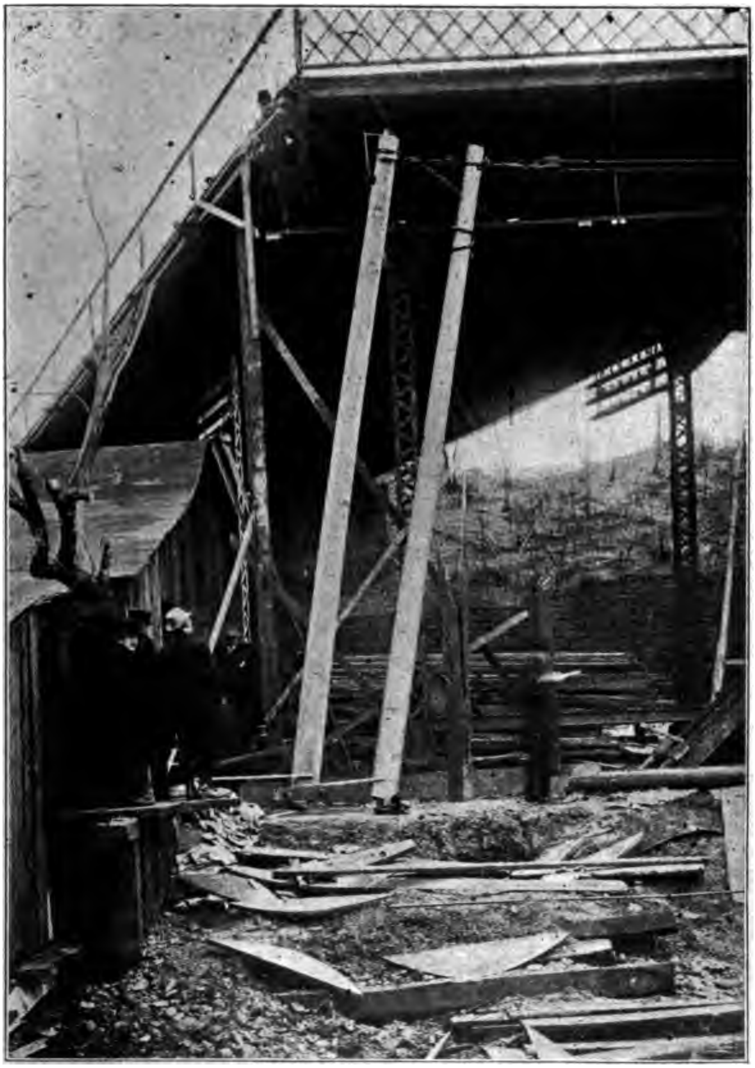
WOODEN POLE.



Test No. 2.
Photo No. 1.
Deflection, 56 inches.

(Pole broke at deflection of 66 inches.)

OCTAGONAL CONCRETE POLE.



Test No. 3.
Photo No. 4.
After pole broke.

(Pole broke at ground level at deflection of 25½ inches.)

DISCUSSION ON MR. CELLAR'S PAPER.

Mr. Camp: Mr. President, I have been requested to take part in the discussion on Mr. Cellar's very excellent paper and regret that this duty was not given to some one more capable.

Mr. Cellar has gone into the subject very thoroughly and left very little to criticise and I can only give a few disjointed remarks, as I only received a copy of the paper a few days ago, and have been exceedingly busy, the same as I presume are all the members of this association.

As far as Canada is concerned we have an ample supply of cedar within, generally speaking, reasonable distance of where required, for many lears to come. Prices for poles are steadily advancing, however, principally on account of the reprehensible habit (from our point of view) that the natives of the United States have in persistently purchasing our best timber, no matter what the original cost, high freight rates and export duties amount to, and we have to take their culls or spend more money.

There is no cedar in Nova Scotia, but we are still able to obtain a good supply in New Brunswick. Throughout the province of Quebec cedar is found and comparatively short hauls are necessary. InI Ontario along the frontier and west of Toronto the cedar is practically exhausted, but there is an abundance north of Toronto and Ottawa and west to Manitoba in various sections and the haul to destination on our lines fairly short. For Manitoba, Saskatchewan and Alberta we are obliged to get our poles either from the Lake of the Woods district for points east of Moose Jaw, which is 400 miles west of Winnipeg, or from British Columbia for points west of Moose Jaw. Our extreme haul for the prairies is about 550 miles either east or west of Moose Jaw. British Columbia produces cedar along the greatest part of the Canadian Pacific lines including branches, but its lasting qualities are inferior to those of the eastern wood. The tapering is also so slight that our speciifications call for one inch greater diameter than on eastern lines.

I do not think that on our system of nearly 11,000 miles of pole line there is a single pole of any other wood than cedar.

The prices f. o. b. cars we are paying this year may be of interest and are as follows:

at Top. Pounds. Ground Line. Time.
Deflection Load, 12 inches above
Deflection

Division.	25x6	30x6	25x7	30x7	35x7	40x7	45x7	50x7
Atlantic	$1.00	.....	$1.30	$1.55	$2.00	$4.00	$4.50	$5.00
Eastern	....	.....	1.40	2.25	3.25	4.00	6.00	....
Eastern Special	....	.....	....	2.75	3.75	5.25	....	9.00
Ontario	1.10	$1.50	1.35	1.75	2.50	3.50	4.50	6.50
Lake Superior	....	....	1.50	2.50	3.00	....	....	....
Central	1.50	2.00	1.85	2.50	2.10	2.40	....	....
Division.				25x8	30x8	35x8	40x8	45x8
Western				$1.00	$1.20	$1.70	$2.40	$3.00
Pacific				1.00	1.20	1.60	2.00	....

We have experimented, to a limited extent, with preservatives, but until the foregoing prices are largely increased it does not pay to spend much money for this purpose. Our experiment was to coat the pole for two feet, at the air and water line, with a composition of pitch-tar and grease applied hot with a brush. This soon scaled off and no apparent benefit was derived.

We then tried a liquid called Carbolite-Carbolineum, applied with a brush, but found that it did not penetrate beyond the surface of the wood. This probably due to the fact that the poles are generally full of moisture when erected. In British Columbia holes were bored on two sides of the pole a few inches above the ground after the poles were up. These holes were 6 to 8 inches deep and made downward at an angle of 45 degrees. They were filled with the Carbolite Carbolineum and closed with short wooden plugs. We find that even in this case, the liquid does not permeate the wood and only preserves a very small circle around each hole. This is also probably due to the poles being full of moisture.

We have therefore abandoned such applications on all our construction this year.

The experience of the C. P. R. therefore confirms conclusions 1 and 2 given by Mr. Cellar against the use of preservatives, and in common with, probably, all other companies we find clause 3 well founded. The lines of the C. P. R. cover so much entirely new territory which in some sections unexepectedly develops an enormously increased telegraph business for the general public as well as for the proper handling of the railway traffic that it is practically impossible to know ten years ahead of what facilities will be actually required.

Although the companies in Canada are apparently certain of a supply of cedar for years to come, I think the time near at hand when manufactured poles will be necessary over some portions of this continent, and Mr. Cellar's paper will probably result in some progress being made. I think the poles should of such a nature that they can be shifted to a new location on account of the many changes along a railway double tracking single lines, putting in new sidings, erection of additional freight buildings, elevators, etc.

Some of the disadvantages of the concrete poles might be mentioned:

(a) High cost for the complete pole.

(b) High cost for hauling. If weight is 3,500 pounds per pole—only 15 to 20 poles per car can be transported instead of 70 to 80 cedar.

(c) Cost of setting. As Mr .Cellar points out, a derrick car would be required. It would be necessary to have a very large derrick to reach to the line of telegraph, which in the case of the C. P. R. must be at least 30 feet from the rail wherever possible. On a busy line of railway very few poles could be set per day, thus greatly increasing the cost of construction.

(d) Every pole would have to be stepped, adding still further to the cost.

As an offset the following are some the advantages:

(a) Permanent poles which would not require renewing, except to increase their capacity.

(b) Freedom from interruption to wires on account of burned poles—a most important gain.

The life of cedar poles I find varies greatly. We are this year rebuilding a line which was originally erected in 1877—30 years ago—and there are over 50% of the original poles .still standing and good for a few years more if the number of wires were not increased. On the other hand we have had poles rotted clear through at the ground line at the end of eight years service. The first mentioned was in Quebec, and the latter British Columbia cedar used on the prairies.

Mr. Cellar: In listening to Mr. Camp's statements as to prices on poles I am reminded of the time, long, long years ago, when I was first in the telegraph service, that is the kind of prices we got in this country. But it is the contrary now. I bought a few 35 ft. poles the other day and was charged twelve dollars apiece for them. As to concrete poles, I think we could come near equipping a 35 ft. concrete pole for twelve dollars, though I may be mistaken. The western cedar is more like the chestnut than like the northern cedar, has a higher resiliency, can be depended upon for strength in the early years of its life a good deal better than the northern cedar can. The northern cedar pole, while seasoning, cannot be dropped off a car without great danger of breaking. I understand you can throw the western cedar over a fence and not break it. The chestnut is a good deal of that nature. While the cedar poles of the north I have no doubt are very cheap, the fact remains there are a lot of us several hundred miles off the C. P. line and we have to buy the poles and pay the freight as well as custom charges.

Mr. Camp: We do not make our freight rate on poles going off our line any too low.

Secretary Drew: We bought some poles this year for some rebuilding work and I was much surpirsed to find even in our country where we have a good many cedar swamps where they are clearing them out now, to find the price of poles 25% more than they were last year. That simply shows those fellows have their eyes open and know poles are going to be scarce and they are going to have the money. Poles we bought last year for 90c, we this year paid $1.25 for—6 inch, 25 foot pole, and not very closely inspected either. But for a 7 inch, good, straight, 25 foot pole we had to pay $1.50. You used to get all you wanted for a dollar the same as Mr. Camp does now.

Mr. Selden: I have great faith in the future of concrete poles.

President Chenery: I have no doubt we could discuss this question indefinitely, but we have so many other papers, perhaps it would be better to pass on.

President Chenery: I will call on Mr. U. J. Fry, for his paper on "Dry Batteries."

Mr. Ryder read the following paper, by Mr. U. J. Fry:

DRY BATTERY.

By U. J. Fry.

Mr. President and Gentlemen of the Convention: As your committee requested me to submit something at this time for your consideration, will give you a line on dry battery as applied to block wire service. I regret very much that it has been impossible for me, on account of an excessive amount of work recently given us, to prepare and forward this paper in time to be printed and distributed with others. Inasmuch as I shall present nothing new, however, I feel that, perhaps, nothing will be lost, and trust there will be no serious inconvenience to you.

It is not the intention to take up the construction of the dry cell at this time, but I will simply give you our experience in using that class of battery in connection with our block wire service, together with a comparison of its cost with the gravity cell in such service.

In 1905 we placed 16 dry cells on the block wire at each Brookfield and Waukesha. On account of earth currents at Waukesha we used one of our other telegraph wires for a return, arranging the keys at both stations with front and back contacts, removing the circuit closers, and arranging the circuit to close on the back stop without the battery and on the front with the battery, in a manner well known to you all. This circuit, including two 50 ohm sounders, measured 271 ohms. Each cell when placed in service measured 1.5 volts, and .125 ohms internal resistance.

At Brookfield we placed the battery on a shelf which had been used for gravity battery, and left in a somewhat unclean condition. At the expiration of 23 months each cell measured 1.31 volts, and 2 ohms internal resistance.

At Waukesha we placed the battery far back on a new and clean shelf in the telegraph table, with a closed door. After 23 months each of these cells measured 1.38 volts, and .68 ohms internal resistance.

We are inclined to attribute the difference in condition of these cells to the condition of the shelves on which they were placed, because the service performed by each has been about the same. We estimate each system of cells has been used approximately 120 times per day, 3,600 times per month, and, if continued, this would amount of 43,200 times per year. We also estimate the keys were closed 3,360 times per day making dots and dashes necessary to form letters and figures, which for one month, would amount to 100,800 times, 1,209,600 times per year, or 2,419,200 times in two years.

From the way this circuit works now we know it will continue to work two years, and, perhaps, longer.

Taking these two systems together we had, to begin with, 32 cells and 48 volts. At the end of 23 months we had 20.96 and 22.08 volts respectively, or 43.04 volts, a loss of approximately 5 volts.

These 32 cells cost $5.12.

To secure the same voltage it would have required 48 cells gravity battery, at an initial cost of 42 cents per cell, or $20.16, to which we add the expense for maintenance at $1 per cell per year, making a total of $68.16 for one year, and $116.16 for two years.

For each additional two years the expense for maintenance would be $5.12 and $96.00 respectively for dry and gravity cells.

At present about two gravity cells per mile are used on block wires on many of the Western, and some of the Eastern Roads. Many of the block stations are closed during the night, and the arrangement of the dry cells to compensate for the extended sections at night will, we assume, take double the number of dry cells, or four per mile, to accomplish the same results.

Assuming the life of the dry cells, when properly installed and maintained, to be two years, we will estimate the maintenance only on a 100 mile block wire circuit for a period of 10 years, as follows:

100 miles, at 2 cells per mile gravity would require 200 cells. To secure the same voltage we would need 133 dry cells, but on account of the longer sections at night, 266 dry cells would be necessary.

For a term of 10 years each gravity cell would cost $10, while the dry cell only 80 cents, or comparatively,

Gravity	$2,000.00
Dry	212.80

I would not recommend cutting down the number of dry cells to the same voltage, but would recommend using double the number of dry cells you use of gravity and thus secure 50% more current to start with, and sufficient to hold up the service near the end of each two years. I estimate the expense as follows:

200 Gravity cells, 10 years	$2,000.00
2,000 Dry cells, 10 years	320.00
A saving of	$1,680.00

This would make a saving of $1,680 per year, which, reduced to a mileage basis, would be $1.68 per mile per annum.

In addition to this we do not need battery cupboard space in our stations, and are free from the accumulation of dirt, etc., accompanying gravity battery, and save the services of the lineman at each battery station four times per year, which is now an expense of about $10 per battery station per year.

We are about to equip two block wire circuits, one 285 miles and the other 125 miles in length, with the dry battery system. A special key and a two lever three point switch have been designed to take the place of the old standard telegraph key and one lever two point switch, for the purpose of preserving in the block wire all the good features, with the addition of one feature which eliminates all objections to the present arrangement, in that, that the operator at one station is unable to extend the circuit between the stations on each side without cutting his entire set out. This will prevent the signals passing any offices, and overcome the danger of operators making mistakes which are liable now when the circuit is cut through as above referred to.

InI addition to using dry battery for our block wire system, I shall submit a proposition to the Telegraph Company before long for the use of dry cells on our short branch lines, where there are say not to exceed two or three offices, and where but a small amount of business is transacted. We are also using the dry cell exclusively in connection with our private line telephone systems; and use it in connection with our synchronizing self-winding clocks, and in our office bell and buzzer service; in fact we use the dry cell wherever we can to the exclusion of all others.

Mr. Cellar: What dry cell?

President Chenery: The advertisement will appear in the proceedings.

(Blue prints were distributed in connection with the paper just read.)

President Chenery: Mr. Fry has undoubtedly given us some information on the use of dry batteries in the telegraph service that has not been presented before.

President Chenery: We have a paper on "Opportunities in the Telegraph Service," by Mr. G. W. Dailey, which we will be glad to hear.

Mr. Dailey: It is now nearly 4 o'clock. We have erection of officers, and it would take about thirty minutes to read the paper and have discussion. Therefore, I suggest the paper be printed in the minutes and distributed that way. It is hard to remember them all and we have to refer to the printed matter.

President Chenery: Hearing no objections, the suggestion of Mr. Dailey will prevail.

Mr. Groce: I think we are rushing things too speedily. I think the Superintendents of Telegraph can make this association at least as strong as the Signal Association, which now has the ear of the American Railway Association. I, for one, would extend this meeting over another day and take more time to consider these papers.

Mr. Hope: Mr. Dailey is a genuine railroad man and I believe it desirable to have him read his paper.

The suggestion made by Mr. Groce, to extend the convention a third day, being put by the chair as a mtoion,

Having been seconded,

Was agreed to.

Mr. Dailey: I will request Mr. Davis to read the paper. I would rather listen to the paper than to read it.

Mr. Davis: Inasmuch as I was asked to lead the discussion I asked Mr. Dailey to let me see the paper. I will say positively it is a splendid paper, and Mr. Dailey can have all the honor and credit that go with the paper. I will, therefore, have to politely decline to read it.

Mr. Dailey read the following paper:

OPPORTUNITIES OF THE TELEGRAPH SERVICE.

By G. W. Dailey, Sup't Telegraph, C. & N. W. Ry.

Delivered Before the American Association of Railway Telegraph Superintendents, Atlantic City, N. J..
June 20th, 1907.

Opportunity is the master of destiny; vigilance in watching opportunity, tact and daring in seizing upon opportunity, force and persistence in crowding opportunity to its utmost achievement, are the martial virtues which command success.

This subject assigned to me is so closely and completely merged with men and methods that this must necessarily be largely a discussion of men and their work in its relation to opportunity in our department.

For convenience of illustration we will consider a young man in the service in the positions of usual advancement, viz., Telegrapher, Agent, Despatcher, Train Master or Assistant Superintendent, and finally as Superintendent. We will endeavor to show the cause and effect, the great bearing and relation that a proper conception and use of opportunities, as they present themselves, has upon the young man's life and business future.

If a young man grasps and makes the best use of the opportunities, which the wise and just employer should see are extended to him from time to time, there is little doubt but what opportunity means success.

First, the opportunity of the Telegrapher.

It is while serving as a telegrapher, his first field of endeavor, that a young man lays the foundation for his future success or failure. It is then that he is thrown among men of greater age and experience, men of varied and complex views and personalities. He naturally selects, unconsciously perhaps, some one or more of them, as examples of what he should be or what he should do. It is then that others have a great deal to do with moulding his character and general make up, and it is then that he needs correct advice and guidance. Do we, as officers, always see that he gets it? It is at this period in his career that he forms habits and methods of work, habits of thought and action that determine largely whether or not he will develop and advance or remain stationary.

This is the period, his first few years, when his personal make up and his opportunities are closely interwoven, and his entire future may depend upon the use he makes of them. For this reason we have seen fit, with your indulgence, to devote a considerable part of this subject to the Telegrapher and the Agent.

A young man entering service as a Telegrapher seldom has any previous business training. He is usually young and in the embryo and receptive stage. He probably would not recognize an opportunity if it stood in front of him.

The friends he makes and associations he forms leave lasting impressions on his mind. He believe all that he sees and mostly all that he hears. He does not usually investigate or discriminate before forming conclusions. He hasn't had to.

In his first year we will say that he may be thrown with an Agent or another Telegrapher who perhaps unfortunately lacked a good business training, or had no disposition to acquire one. No method or system of doing things. If a patron wanted a rate; hunt all over the office for the proper tariff, or wire General Freight or Passenger Agent for it. Papers, way bills, etc., piled indiscriminately over tables and desks, does his work safely enough, but has a hard way of doing it. Too much lost motion. A general atmosphere of indifference and dissatisfaction as is usual under such conditions. Naturally the young man is influenced by such conditions. He reasons that if the other fellow can get along and hold his job under such conditions, and with the minimum of personal effort, why can't he. He does not realize that perhaps more personal effort is involved due to lack of order and method. No one may have explained these things to him. No better way has been presented or illustrated to him. He fails to see his opportunity to step into the breach himself; to try and bring order, method and system and general betterment out of it. Perhaps he hesitates to exert his own views or influence on account of not wishing to hurt the feelings of his associates, or fear of their displeasure. He doesn't know how some of the officials would look at it. He may think of acting, but does not act. Things go on in the same old way and so does he. He has missed an opportunity. Is he alone? No; Some one else, some officer, has also missed an opportunity there.

Another illustration; We who have been dispatchers have often heard the following dialogue over the wire:

Dispatcher: Where is No. 25?

Operator: Here.

Dispatcher: What are they doing?

Operator: Don't know.

Dispatcher: Have they got coal and water yet?

Operator: Guess not.

Dispatcher: When will they go?

Operator: Don't know. Will see, etc.

This operator is not posted. He does not know that what he ought to do was to have found out all about it, and had it already for the dispatcher, and given him all the information at once before being asked for it.

He does not keep a small train sheet of his own, and jot down how each train is from hearing other stataions report them. as we used to do in the old days. Does not keep Dispatcher advised when trains are coming. Does not even keep him advised of the delays of trains at his station until asked, then don't know much about it. Don't know what cars there are to go or where located in the yard so can inform conductor and save time; lacks energy, ambition aand interest in his work; conductors and Train Dispatchers don't think much of him, they don't try to help him. He gradually acquires a reputataion for laziness or indifference and is relegated to the rear. He has missed an opportunity; and as before. some one else, some officer, has missed one with him.

Now on the other hand we take the bright, active and hustling young telegrapher, and am glad to say this type is in the majority. He has everything clean and in order. His emergency signals burning brightly after dusk, even though he has had no necessity for using them for months. He knows what cars there are to go, where they stand and a switch list ready for the conductor. He knows where all trains are, and can inform a patron without asking the Dispatcher. He informs the Dispatcher when trains are coming, or when they are ready. If delayed, he knows why and informs the Dispatcher so fully that no questioning is necessary. Don't nee da derrick to get the information. He is uniformly industrious, obliging, ambitious, and does all he can to help the Agent. the Conductor, the Train Dispatcher, and the public, and endeavors to please them all. What is the consequence? He has them all boosting him, all singing his praises. It reaches the ears of the men who can help him and he gains promotion. He has made his opportunity.

His next position we will say is that of Agent. He realizes the importance and responsibilities of his position. He is the color sergeant of his company. He knows he is practically the General Manager and everything else at his station, and that the road he represents is gauged by his calabre, and is judged as he is judged.

It stands in the estimation of the community largely as he stands. He is representative of it. He keeps peace in the family and in the vicinity. Keeps his officers posted as to everything of interest in his community. Knows he can do more good advertising for the company than any one else, and does it.

He does not complain that his salary is too small, but says he will make himself so valuable that they cannot get along without him, and that they will have to promote him, when he will receive more salary. He reasons that so long as he is a part of the organization, he wants to be a strong one and do everything to further its interests while he is a part.

He does not disparage the company he works for as that would disparage himself. If he can't get in line he will get out. He isn't carrying water on both shoulders. If a member of a labor organization, he is loyal to both, and to the advantage of both.

If he has any trouble or grievences he does not proclaim them from the house tops, but wisely keeps them in the railroad family, and doesn't trouble or edify the general public with them.

When his townsmen feel that they should be in fashion and do a little legislating against the Railroads, he knows that he can do more than any one else on the road to offset it, and does so. He tells his neighbors some of the good things his company does. Gets out and shows people where they are misinformed, and what the road has done for their town, even though they won't admit it. Explains many things that are not understood. Stands by his colors so well that even his opponents respect him for it. Tells his town people that his company is the best on earth, and says it so often, and stands by his guns so well that by and by they think so themselves. They also think he is the best

Agent on earth, and wouldn't have any other. After a while the company finds it out and he is promoted. He has made and improved an opporunity.

The next we hear of him he is a Train Dispatcher. One of the most exacting, important and responsible positions in the service, and unfortunately sometimes not appreciated as much as should be. Usually if a man makes good as a Dispatcher his future is assured, and he certainly has earned it. The qualities that brought him up from the ranks are still necessary for his success, with the addition of certain other qualities; principal of which is his ability to handle men in such a manner as to bring out their best effort and result. It is as a Dispatcher that a man first assumes authority and power of direction over others. It is then that the first real test of his official ability, and fitness for further advancement comes. Thereupon rests his opportunities.

Passing over the Train Dispatcher we will consider the Chief Dispatcher, and for the sake of brevity we will say that the same general principles concerning him apply likewise to the Train Master or Ass't. Superintendent. We all know the duties, the trials and tribulations of the Chief Train Dispatcher. We will here consider him only in his relation to the men under his direction, as I consider this matter of handling and directing employees one of the most important phrases of his work and one bearing largely upon his opportunities. On most railroads the Chief Dispatcher usually handles the Telegraphers on his division. Right there lies his greatest opportunity and his greatest responsibility. The responsibility of molding the future business career of a great many young men.

We all know that the Chief Dispatcher is the busiest man on the railroad and can make or break a division. Most of the failures and misfortunes of the division are often laid at his door because some one else doesn't want to assume responsibility. He doesn't always receive his full share of credit for the good results that he is a party to. Some one else often takes the credit. He is entitled to our full sympathy and support.

With his many and varied duties of handling cars, motive power, trains, etc., he is charged with the duties of examining, appointing and handling the telegraphers. On small divisions this may be all right but it will not work out right on heavy divisions. This plan might have been all right twenty years ago, but it is not all right in the present day. Railroads have outgrown it. We need closer supervisions. On our road, am glad to say, we have covered this very satisfactorily.

Agents and Telegraphers are necessarily isolated and scattered over the divisions and it is more difficult to see them, watch them and get close to them, than it is to Train or Enginemen. The Chief Dispatcher must not overlook the importance of close supervision and education of these men. We should have systematic and well defined methods of molding, developing and looking after these young men whom we know we will have to use as Agents and commercial representatives later on. How many times a year does the average division officer, or any other officer, get off at a small one-man station and stay long enough to get well acquainted with the Agent or the night operator. The young man at the smaller places, especially the night man, doesn't have opportunities to talk frequently with his officers. He absorbs his ideas from the men he works with every day, from the Telegrapher's Journal, and other trade journals. There is not much around him to inspire him with any feeling of Esprit de Corps or loyalty. The Chief Dispatcher who realizes the fact that the young telegrapher needs guidance and counsel, acquantance and encouragement; the officer who will so arrange his affairs that he can see all his men at least once a month, become well acquainted with them, know each man's strong and weak points, enthuse them with a spirit of pride in their work, and a desire to excel and succeed, inspire in them through personal example, a feeling of confidence in the justice and integrity of their officers, has an opportunity that is well worth seizing.

We now come to the opportunities of the Superintendent. His field is bountifully strewn with the fragrant flowers of opportunity if he will but pluck them, and our own field, the Telegraph Department, is as fair a field as any. We will consider here but two of the most important:

First: Raising the standing of the department in the railway world to the place it rightly deserves by virtue of its importance and worth.

Second: Raising the standard of the personal to a higher plane, thus providing for the present and building for the future.

While we have no complaint on our road, or on some others that I know of, on this score, it occurs to me, from general observation, that a good man Railroads do not fully appreciate the value and importance of their Telegraph Departments. Why should this be? and why shouldn't it rank higher in the business organization of the roads, and higher in importance in comparison with other departments. We take our hats off to the operating man who makes a record on train movement or tonnage, and to the traffic man who produces the goods. Why not to the telegraph man who produces first class telegraph service? Is not the Telegraph Department one of the greatest aids and utilities in producing these results? It is the eyes and ears, the nerves we may say, of the railroad organization.

We assume that one reason the Telegraph Department is not accorded higher rank and standing is due to the fact that it is generally regarded as a non revenue producing department. At least what it does produce cannot be reckoned in dollars and cents. We know it to be a fact that indirectly it does produce revenue by being the greatest and most important asset or facility of those that do produce revenue. If the Freight and Passenger Department, for instance, did not have good prompt, reliable telegraph service at their disposal, would it not have a heavy bearing upon the results and revenues of their departments. Would this not be true also of the Operating or any other department. By virtue of its use alone it cannot and should not be regarded as of minor importance.

It is fair to assume that another reason, and perhaps the prime reason, why the Telegraph Department is sometimes regarded as of minor importance and standing, is: that the Superintendent himself does not boost and push his own department as much as he should; does not enter into general affairs enough; does not enlarge his field of endeavor or the scope of his duties; does not get into the game often enough; does not seek or assume responsibilities. In our opinion such a course is inimical to the good of ourselves, our departments and our companies. We as officers should seize every opportunity to fairly and honestly raise the dignity and standing of our department and one of the best ways to do so is to produce first class service.

We should seek opportunities to enlarge our field of endeavor and to enter into the general affairs of the railroad. We should fit ourselves for higher positions. We have an excellent opportunity for studying the entire railroad. Its methods, policy and physical conditions, and fitting ourselves for advancement.

When the departments of a railroad are lined up for inspection, or when on parade, there is no reason why our department should bring up the rear, with the cooks and ambulance corps. We ought to be well up in line where we can see the colors and hear the band. This, however, is a result that can be accomplished only through the personal effort and worth of the Superintendent, combined with proper support from his officers as well as the rank and file, and there lies an opportunity.

Now as to raising the standard of the personel. In our judgment this is one of the greatest questions of the present time, because it is the effort of the personel properly directed that produces all results. Loyal willing work is the basis of all good results. As officers, what are we doing to bring this out? Fifteen years ago when roads were smaller it seemed easier to maintain a close business acquaintance between officers and men, which was of great benefit to both. Now, when roads are larger, we have to adjust to meet the changed conditions.

Briefly touching upon this matter of raising the standard of the employee, I will refer particularly to the Telegraphers. Some Telegraph Superintendents handle these men direct; some handle them in general; some don't have anything to do with them. As to that: I think the Superintendent Telegraph should have authority over telegraphers and railway telegraph service matter, as well as construction matters. He should stand above the Division Superintendent in authority in this respect.

Reflecting back to my earlier remarks on the Telegrapher and Agent, we, as officers, should undertake and find ways and means of educating and guiding these young men away from the bad and up to the good points I have previously mentioned. By very virtue of their situation they need more attention than do train or enginemen. They are isolated, as it were, by themselves. We should find ways and means of reaching them; of showing them the right way to do things; of encouraging and developing them to the highest standards of efficiency.

In this day of organization, show them they can easily be loyal to the company as well as to their organization. If they belong to one they don't have to obtain a divorce from the other. Show them that they can make their order a power for good and a means of educating and advancement in a personal sense, as well as a means of settling their troubles.

Encourage and advise subordinate officers especially, who should be high minded and sympathetic as well as strict and just disciplinarians, to get close to their men, to know them well, to treat them fairly, squarely and impartially, to bring out the good thats in them, and then do all these things yourself. It does no good to resolve that these are good things. The thing that counts is, do it. The men who counts is the man who does things. The man of action is the man that accomplishes. Instill in our forces a realization of the importance of care and correctness, system and method in everything they undertake. We should meet with and acquaint ourselves personally with as many employees as possible and demonstrate that because one man is an officer and another an employee they do not necessarily have to stand at arms length. There should be no wide gulf of imaginary lines between officer and employee. We are all employees for that matter. A man sitting alone on top of a mountain is in a mighty exalted and dignified position but there may be others on level ground that it would pay him to be with. A perfect distribution of the personal equation is a valuable asset and a splendid plant to cultivate.

Human nature is the same the world over. If we can bring out and develope its best points in our employees, enthuse them with the old time spirit of pride in their work and the Esprit de Corps that all should have; inspire in them feelings of loyalty to themselves and the company; feelings of confidence in the justice and integrity of their officers, then the standard of the personel from office boy to Superintendent will rise and continue to rise, and the results of our efforts will live on when we are gone, and will be a worthy legacy to our business posterity. In this alone can the highest grade of service be attained.

In conclusion we must ever remember that in conventions like this we may resolve and recommend, pass resolutions and regrets, write splendid papers or make the rafters ring with the reverberations of gifted oratory, but if we do not execute them, do not do things, we gain nothing. It is not the gifted writer or orator but the man who buckles on his armor, marches forth from this convention armed with a desire and a determination to accomplish some of the many good things we have heard about here, that will succeed. In his desire to be of the utmost value to himself, his family, his company and his country he will find his field of endeavor overflowing with the beautiful flowers of opportunity.

The paper was received with applause.

President Chenery: There is no question but what it would have been a mistake if Mr. Dailey had not been permitted to read that paper.

Mr. Hope moved a vote of thanks be tendered Mr. Dailey for his paper and that it be printed in the minutes.

Which was seconded,

And agreed to.

President Chenery: Mr. J. L. Davis, of the C. & E. I., was billed to lead the discussion and we will be glad to hear from him.

Mr. Davis: I will say I looked over Mr. Dailey's paper very carefully. It certainly is of great importance for the Dispatcher to get out on the line and come in closer contact with the men. I know from my own practical experience just exactly what that does for the chief train dispatcher, and I know what it does for the Superintendent of telegraph. Two years ago the C. & E. I.—the Chief Dispatcher was loaded down with work until it was absolutely impossible for that man to get out on the road at any time without neglecting the work that demanded his personal attention in the office. Finally the Chief Dispatcher was allowed an Assistant Chief Dispatcher. It was not looked upon very favorably by all concerned, and it lasted only a short time. I was very much pleased, about thirty days after the Assistant Dispatcher had been taken off, to find the very men who opposed putting on the Assistant Chief Dispatcher were the very men who came before the General Manager and said, in my presence, that they had made a very great mistake, when requested to reduce expenses, by taking off the man they found was really the most important man that they had, and that was the Assistant Chief Dispatcher. And his great importance to them came about by his relieving the Chief Dispatcher who could be free to go from office to office and supervise the work of the Operators, become acquainted with what they were doing and very frequently assist the Division Superintendent in the performance of his duties. Now, at the present time, our Chief Dispatchers are again free. We have Assistant Chief Dispatchers who look after detail work, and the Chief Dispatcher can go and come when he pleases. We are liable to find him on any train or at any sation at any time. We are getting very good results since having adopted that method.

I do not know I can say anything more on Mr. Dailey's paper. You heard it, and I fully agree with him in all he has said. (Applause).

President Chenery: Mr. Sherman was to participate in this discussion, but he is not present.

Mr. Hope: The paper speaks for itself.

Mr. Dailey: It doesn't seem to me that we pay as close attention to the operators as we ought to, and one of the thoughts to my mind in that paper was, that it is up to us to get busy, if nobody else does, and get as close as we can to the operators and make them just as important as the train or engine men. They are. The man who secures the freight is as important as the man who hauls the freight. Developing the men in the station service will accomplish a good deal of good, not only for the men but for the company. I consider that a part of the officers' duties. I consider it an officer's duty to look after the welfare of the men working under him just as much as he can. Training the personel of the telegraph department will do a great deal of good. That was the idea that run all through this paper of mine. We are talking continually about getting better engines and better tracks, and the officers of the road are talking of time and tonnage, but how often through the year does anybody talk about the telegraph?

Mr. Groce: The Superintendents of Telegraph, I imagine, have got some new ideas, and I feel it is much better to have had time given these subjects. A short time ago I was shown some reports sent in by two inspectors. These men seemed to spend their time visiting each office and examining the men as to the rules, their efficiency, etc., and it struck me as being a splendid idea. I advocated this and have succeeded in securing it and I think it is one of the best things I have seen for some time.

These ideas as they come up, if we bring them before the management, they are brought to a closer realization of things. I know the managers of our road read the proceedings of the Signal Association, for instance, and also the Telegraph Association. It cannot be helped but these papers here will strengthen their purpose to improve the personnel of the telegraph department, and they can only do that through the Superintendent of Telegraph. On the system I represent, a record of employees has not been kept. I am seriously thinking now of beginning a system whereby we can tell every day where we stand. We have blanks sent in monthly showing the different men who have been dismissed and showing cause, but before that information percolates to other divisions he has gone to work again.

Sometimes they get in and work for quite a while and it is rather unfair to bring the matter up and dismiss them for an old offense.

Mr. Selden: "You never miss the water 'till the well runs dry." It is curious with many years of experience, yet I am unable to fathom the reason for the slight regard that the railroad people, as a general thing, have for the Telegraph. If there is a question of putting in a side-track there is a lot of figuring done and sometimes months pass before the actual work is done, whereas they say to the telegraph department: "We are going to put in the block system and we want another wire sixty-five miles long and we want it right away." At the end of a week there is your wire. See the apparent ease and short time as compared with track construction, and you have good reason to wonder why the telegraph work is so lightly regarded. The telegraph department is recognized as more important every day. It used to be hard to get lines up, but it is not hard now. We now have camp cars and we run special at night, not only for the railroad wires but for others besides. It is very rare any wires remain down over night. We are gradually and surely forging to the front.

When a man makes an application to one of our division operators for a position we refer to our card record, which is complete, and if we have no record we simply reply "no record." As I stated the other day, the moment a man is employed a card is started, so, although he may be employed on the extreme end of the line in twenty-four hours we have that card. If necessary to suspend, the first duty is to make up the card, and we keep track of that man. And the same follows promotion, so we have very little difficulty.

It has always been gratifying to me to feel, although the telegraph department was hardly appreciated by the railroad, that the personnel of the Superintendents, as a general thing, has been of the best.

Mr. Taylor, A. B.: I agree with Mr. Selden. Conditions so far as recognition by the management of railroads of the telegraph department have improved. During my short experience as Superintendent of Telegraph I have seen marked improvement in that regard. I certainly have nothing to complain of so far as our management is concerned in regard to improvements that have been brought about. Still I could not help but think, as Mr. Selden and other gentlemen were speaking, there is a great deal yet to be desired. It is quite a common thing to get a telegram from the Division Superintendent like this: "A new station at such a point will be opened on Monday. Old station to be moved some 100 feet from present location. Please have wires cut in by tomorrow night. It will also be necessary to remove three poles." It doesn't matter where they are to go. You must remove those poles and this must be done at once so as not to delay the work. We have all had experience of that kind.

Mr. Hope: I want to inquire, outside of the election of officers what other business we have before us.

President Chenery: We have a paper by Mr. Parsons, who is present; also a paper on "Wire Testing" by Mr. Jones; on "Error Sheets" by Mr. Logan; "Railway Telegraph Service" by Mr. Brown; "Visible Supply of Poles" by Mr. Ashald." In addition to that we have committees to report, one, as I stated this morning being a very particular one, and that is on Legislation for Wire Crossings.

There is another committee to report, on Pole Construction, and undoubtedly both of these reports will be very interesting.

Mr. Davis: There is one matter that was taken up at the Chicago meeting—Mr. Ashald was appointed chairman of the committee and I was a member with him—and that is the matter of getting up a blank to be used by telegraph operators in transferring unfinished business. I have got the papers and a sample blank decided upon, and when the time comes it will only take five or six minutes to dispose of the matter. The General Manager of the C. & E. I. called on me to know what progress we were making with the matter and I told him there was nothing to be done until this meeting was held, and asked if I should go ahead and fix up blanks according to my own ideas or whether he would be willing to wait until after this meeting. He said: "I would prefer to have the opinion of your convention." I dislike to go back to Chicago and say nothing has been done. If we can arrange to give that little matter five or six minutes before we adjourn I will appreciate it.

President Chenery: I see no reason why we should not handle that committee's report after we dispose of the papers.

Secretary Drew: It is ten minutes to five. I think we ought to have election of officers and the selection of the next place of meeting now, and then put in the rest of the time on the papers. If it is not out of order and meets with the approval of the gentlemen present, I move that we change the order of business and now proceed to the election of officers and the selection of the next place of meeting.

Which was seconded,

And agreed to.

ELECTION OF OFFICERS AND SELECTION OF CONVENTION CITY.

Secretary Drew: I suggest that we select the place of meeting first, as sometimes that has something to do with the selection of officers. In that connection I will say that we have invitations from different quarters asking us to meet in the various cities, the most pressing one being brought to us by Mr. Camp, to meet in Montreal.

Montreal, June 10th, 1907.

The President, Association Railway Telegraph Superintendents, Atlantic City, N. J.

Dear Sir:—We beg to extend to you a hearty invitation to visit our city upon the occasion of your next annual gathing.

Montreal is the commercial metropolis of the Dominion of Canada and a city with a history replete in incidents and records affording interest to every citizen of the North American continent.

In behalf of our Executive Committee I beg to transmit to you some further information as to Montreal and its surroundings embodied in a little booklet entitled "Montreal."

Canada is attracting attention at this time to a very wide extent indeed. This is due in the first place to her endowment by Providence with an astonishing wealth of natural resources and fruitful possibilities.

The energy of our people is not alone confined to the making known of our country to an interested outside world, and I can assure you that if the Members of your Association will honor our city by selecting Montreal for the place of meeting for 1908 that you will find Canadian energy as prominent in its endeavor to welcome the stranger and visitor as it is to attend to the more serious duties of our Canadian citizenship. I have the honor to remain, Dear Mr. President,

Your respectfully,
HENRY MILES, President,
Dict. H. M. Montreal Business Men's League.

Montreal, June 11th, 1907.

To the President, The Association of Railway Telegraph Superintendents.

Sir:—I have the honour on behalf of the Council of this Board to heartily second the invitation extended to your Association by the Montreal Business Men's League to hold its next annual convention in this city.

As the headquarters of two of the greatest railway systems of this Continent, Montreal should be of interest to an Association whose members are so closely connected with the railways, and the city also offers in a general way many attractions for visitors.

Assuring your Association of a hearty welcome whenever it may decide to come, I have the honour to be, Sir,

Your obedient servant,
GEO. HADRILL, Secretary.

Mr. Ryder moved that Montreal be selected as the next place of meeting,

Which was seconded,

And agreed to.

Mr. Camp: I want to thank the association for sele
ing Montreal as the next place of meeting. In this c

nection I might say that we will probably be able to give you a little more entertainment than is possible at Atlantic City. Mr. Kent told me before leaving that I might state it is altogether likely, if Montreal was selected, that he would be able to arrange a side trip over the Canadian Pacific to the ancient city of Quebec, though I cannot promise that definitely. Mr. Ashald telephoned me he would do his part towards having a trip over the Grand Trunk and cooperate with me in securing a return trip by the Richalieu and Ontario Navigation boats down the Rapids. The Business Men's League will, also, assist in the entertainment.

President Chenery: The members who attended the Montreal convention remember it with pleasure. I think there is no question but what we will have a good time at Montreal. But if we work from 9 o'clock in the morning until 11:15 at night, I do not know where the entertainment comes in.

ELECTION OF OFFICERS.

Mr. Hope: For the office of President for the ensuing year, I nominate Mr. E. P. Griffith, of the Erie Railway.

Which was seconded.

Mr. Davis: Considering the work that has been done in the last year, considering the very large amount of extremely important work that lies before the members of this association within the next year, considering that the man who now holds the position of President has had probably more experience in work along the lines he is now pursuing than any other member of this association, considering that he is probably better known as a railroad man throughout the United States than any other member of this association, and with due respect to all others, I nominate Mr. E. A. Chenery, of the Mo. Pacific, to succeed himself as President of this association, and I urgently request all members to cast their ballot.

President Chenery: I think it would be in order for me to say Mr. Davis is out of order. I appreciate fully his kind remarks and certainly am alive to the honor conferred upon any one occupying the position of President of this association. But it is contrary to precedent, and I think it would be well to not trample on any such corns as we might step on. I, therefore, respectfully request that my name be withdrawn.

Mr. Griffith: Last year we met at Denver and because we have met at Atlantic City on this occasion is no reason why we should follow an old rule. I believe we were inspired to select a man suitable to carry us through the difficulties which confronted us, not for one year but for two. I thank you, my friends, for placing me in nomination, but I decline the office in favor of Mr. Chenery.

Mr. Hope: The office of president has certainly been well filled during the last year and we are all proud of our president. We have honored him for one year and as there are others I decline to withdraw my motion.

Mr. Ryder: We all appreciate the success of the association during the term of our president. I move the secretary cast the ballot for Mr. E. P. Griffith for president for the ensuing year,

Which was seconded,

And agreed to.

The Secretary cast the ballot as directed and the President announced Mr. E. P. Griffith elected President for the ensuing year.

VICE-PRESIDENT.

Mr. Ryder: I would like to place in nomination for the position of Vice-President G. W. Dailey.

Mr. Dailey: I appreciate the honor. I would like to nominate Mr. Ryder.

Mr. W. J. Camp was nominated.

Mr. Camp: As this is a United States Association—

Secretary Drew: No, sir; it is North America.

The nomination of Mr. Camp being the only nomination seconded.

Mr. Groce moved the nominations close.

Which was seconded,

And agreed to.

Mr. Parsons moved the Secretary cast the ballot for Mr. W. J. Camp for Vice-President,

Which was seconded,

And agreed to.

The Secretary cast the ballot as directed and the President announced Mr. W. J. Camp elected Vice-President for the ensuing year.

Mr. Camp: I think you gave me enough honor in selecting Montreal as the next place of meeting.

SECRETARY.

President Chenery: The next office is one for which there will undoubtedly be a good deal of contest.

Mr. Hope moved the President cast the ballot for the Secretary and Treasurer,

Which was seconded,

And agreed to.

President Chenery: As there is no name suggested, I presume it is left to the discretion of the President. I, therefore, take great pleasure in casting the ballot for Mr. P. W. Drew, as Secretary and Treasurer.

Secretary Drew: I didn't read all of Mr. Greene's telegram. I thought it was not proper to read it at that time, but he put in a sentence which says: "In case of any doubt of your re-election you have my proxy." I was sure of one vote.

President-elect Griffith was escorted to the chair mid applause.

President Griffith: I am sorry you made this mistake. It is too bad. ("Brace up. Forget it.") I can't until after we adjourn. However, I thank you. I cannot see any reason for making this mistake, even considering how serious it is, except it is that your stay in Atlantic City and New Jersey has been so pleasant—and busy—that you wanted to elect a man from Jersey to show your appreciation. I believe that is the only reason.

President Griffith: Inasmuch as we are to stay over until tomorrow, I believe that motion is already carried, I think a motion to adjourn is in order.

Mr. Chenery: While that motion did prevail, it was suggested that, perhaps, an evening session—

Mr. Groce: I wish to speak against any more night sessions.

Mr. Ryder: I want to know what is this rush to get away from Atlantic City. Having experienced difficulties in getting papers in the past. it seems to me very queer that when we find a committee that has been able to get something as this committee has done, for us to rush through the meeting, helter skelter, and act as though we were disinclined to give a proper amount of time to consideration of the papers is not at all courteous. I don't think it is fair to the men who have prepared these papers. The Signal Association has been referred to several times as being on a better basis than that occupied by this association. I wonder if the members secure a time-card as soon as they get in a town to see when the next train leaves. What is the matter with us, anyway? I wonder if Mr. Dailey didn't hand us personally a rap last night.

Mr. Rhoads: Possibly the largest difference between us and the Signal Association is that they pattern largely after the American Association and work through committees. Their committees formulate a good deal of their work and consequently they get through a little quicker than we do.

Mr. Cellar moved the convention adjourn until 9:30 o'clock tomorrow. Friday morning,

Which was seconded,

And agreed to.

THIRD DAY—MORNING SESSION.

(Friday, June 21, 1907.)

The convention was called to order by President Griffith at 10 o'clock A. M.

President Griffith: The next paper on our list is one by Mr. L. M. Jones, on "Wire Testing." Mr. Jones is not present. I believe Mr. Ryder will favor us.

Mr. Chenery: Before starting on that paper, lest we forget, I would like to make a motion that sub-committees of this association be appointed to represent the East and the West, and the South if you choose, these committees to consist of three members and to hold quarterly meetings at some point to be designated by them, the object of these meetings being to discuss matters of interest to the association generally, and for the purpose of securing papers, we will say, for the next annual convention. My object is to arrange for meetings after those we have recently had in the west. Therefore, I make a motion that the president appoint three committees to meet and discuss subjects that may be suggested to them.

Which was seconded.

President Griffith: I think that is a very wise thing. You have seen the great benefits to be derived by the western meetings. If the meetings are held quarterly we can arrange our affairs so as to be there. As I understand it to be in the power of the chairman to call a special meeting if thought necessary. Do you incorporate that in your motion?

Mr. Chenery: I had in mind the appointment of committees to take in the East and West and they to make such arrangements for meetings as would appeal to them. For instance, in Chicago the meetings were brought about by some local condition, and it was really no attempt at organization at first, but I think it was at the second meeting that a chairman was appointed and he took it upon himself to notify everybody when the next meeting would be held and what would be discussed, and my motion was intended to appoint committees to arrange for such meetings and such discussions as suggested themselves, the details to be left entirely with these committees.

Secretary Drew: There are few members of the association in the South. There would be six you could get down there. Perhaps it would be a good thing to give these fellows a chance to get together. Some of them don't know very much of what we have in this association except when it comes to paying dues.

Mr. Walstrum: I think it should be allowable for the members to attend both meetings. There might be men in the East and South or West and South. It seems to me two committees are all we want.

Mr. Parsons: These committees would not hold their meetings at the same place at the same time, and I think the chairman should be instructed to send a synopsis of the minutes of each meeting to the other committees.

Mr. Chenery: I will modify my motion and make it two committees.

Secretary Drew: I think there is some misapprehension in the minds of some as to what this means. It does not mean that these three men are to get together and hold their meeting, but it is intended that these men shall be responsible for calling a meeting and getting all the members in their territory to the meeting. It seems as though three would be ample to do that. They are not the officers of the meetings, but when the members get together they will elect a chairman and secretary of their own body.

The motion to appoint two committees, of three members each, having been duly seconded,

Was agreed to.

President Griffith appointed the following as said committees:

EASTERN COMMITTEE.

C. Selden, B. & O., Baltimore, Md.

L. B. Foley, D. L. & W., N. Y.,

A. B. Taylor, N. Y. C. & H. R., New York.

WESTERN COMMITTEE.

E. A. Chenery, M. Pac., St. Louis, Mo.

J. L. Davis, C. & E. I., Chicago, Ill.

C. S. Rhoads, C. C. C. & St. L., Indianapolis, Ind.

President Griffith: You understand it is the duty of the chairman to make the call and name the place of meeting.

Mr. Davis: I suggest Indianapolis be considered the most eastern city within western territory and that Cincinnati, for instance, be the western point for eastern territory.

Secretary Drew: I think we had better divide it according to the Central and Eastern time. That would be very easy for us all to remember.

Mr. Chenery: I think this will work itself out. The committee will notify those whom they might think in their sections. Since I have been honored by being appointed chairman I will make every effort to get all the people of the West and a good many people of the East to attend our meetings.

Mr. Ryder read the following paper, entitled "Wire Testing," by L. M. Jones.

In the successful operation of a telegraph system carrying, as most systems do, a volume of business almost equal to the capacity of the facilities under favorable conditions, it is of the utmost importance that all the wires available be kept in use as nearly all of the time as possible.

To do this, some one must be made responsible for all delays in locating and removing trouble, which can best be done by the division of the territory into wire testing districts.

The proper location of the wire testing offices is very important, as there are usually many things to be taken into consideration. Almost invariably there exists on every wire testing district a necessity for repeaters or quadruplex apparatus, and in order to have these located under the direct supervision of the Wire Chiefs, the office is located where the repeaters and multiplex apparatus are required.

In order to secure the best results, the hours of duty should not be such as to overtax the physical ability of the Wire Chief. The twenty-four hours may be divided into three tricks of eight hours each, corresponding with those worked by train dispatchers. The first trick, 8 A. M. to 4 P. M., can be taken care of by the Manager of the office, with the dual title of Wire Chief and Manager; the second trick, 4 P. M. to midnight, and the third trick from midnight to 8 A. M.

The Wire Chief and his assistants, to be successful, must, in addition to having had experience in wire testing, be fully posted in the handling of multiplex apparatus.

One thing very essential to the successful Wire Chief is patience. Few operators at way offices understand thoroughly their switchboards and circuits even when regular, consequently when asked to make a patch, they lack confidence in their own ability, and should the Wire Chief lose patience, the result will probably be a wrong connection, and the loss of much valuable time.

Each wire testing office should be supplied with, in addition to a spring jack switchboard and spare sets at the board for testing purposes, a milammeter and voltmeter of suitable scale ranges.

In the location and clearing of trouble, the methods in use are much the same everywhere; however, will enumerate separately those which are usually followed, and from which satisfactory results are obtained.

FOR A GROUND.

The margin or pull of the relay magnet will give you a good idea as to whether the wire is grounded near you; then proceed by having offices open the wire until the ground is located between two offices.

FOR AN OPEN CIRCUIT.

If the circuit is a comparatively long one, and paralleled by other working circuits, place your voltmeter in the circuit for a moment. If near you, the needle will remain almost stationary; if very unsteady. the open is probably some distance from you. Or, place the open wire on a battery of preferably more than one hundred cells, then cu in a test and let the relay spring down low, opening an closing your key. If the break is comparatively close very short dot will follow the opening and closing of key; if further away, the dot will become perceptibly plainer, increasing with the distance from the test office to the open. A large number of relays in the circuit, however, will detract from the sensitiveness of this latter test. This will save time in tracing for the location. Have different offices ground the wire until located in an office, or between two offices. If the wire is broken between offices, one end will usually touch the ground and remain grounded, while the other will remain open. This. if known, will give you a good idea as to the location outside of an office. However, the usual office tests should be made.

FOR A CROSS.

When two or more wires are crossed, have the distant terminal open all wires affected except the most important wire. Then locate by having different offices open one or more of the wires which are out. When located between offices, have the usual office tests made to be sure it is outside.

FOR AN ESCAPE.

An escape may be either an escape to a ground. or to another wire. An escape to a ground is located in the same manner as a ground.

An escape to a cross is located the same as a cross. If only slight, it may only be felt with a voltmeter, and resemble closely poor insulation.

In testing for trouble in an office, first have the wire cut out at the bottom of the board. removing the instrument plugs. This will clear the wire if trouble is not in the board. If this does not clear it, have the wires removed from the top of the board, and the ends twisted together.

This will clear if in an office. The same test at the other of the two offices between which the trouble was located will definitely locate it outside of an office.

To clear a switchboard of a burned lightning arrester, remove the grounded wire temporarily until the plate can be removed and filed or scraped, and insulated with mica. If an office has hinge or gate cutouts instead of a switchboard, the wire should first be cut out, then if the trouble does not disappear, the removal of the ground wire from the cutout will have the same effect as taking the wires out of the top of the switchboard. A plug cutout or one-wire board should be handled in the same manner as a switchboard.

Wire Chiefs often complain of failure of operators to follow instructions, especially when requested to remove wires from the top of switchboards, especially when requested to remove wires from the top of switchboards and cutouts. This is sometimes due to the fact that linemen have used pliers to tighten nuts, and the operator not having a pair, is unable to take the wires out, and rather than tell the Wire Chief he cannot do so. makes a bluff by waiting a sufficient length of time and probably saying, "Now," leading the Wire Chief to believe the wires have been removed.

In order that a lineman may not be given a wrong location, for example, the day chief locates trouble on his district, which, the lineman being at some distant point, and train service such as to make it impossible to reach the trouble before dark, instead of notifying him at once, transfers the trouble to the second trick chief; he re-tests and transfers to the third trick chief, who re-tests and notifies the lineman. In this way, no time is lost in clearing the trouble, and the lineman is not disturbed in case the wire comes clear in the meantime. If an interruption is reported to a lineman by the first or second trick chief, and he fails to clear the trouble before dark, he reports this to the Wire Chief on duty. The wire should then be re-tested and the lineman advised if still in, or of any new developments.

All wires should be tested by the third trick chief before daylight. Linemen understand if no trouble is reported to them, none exists, leaving them free to carry out any projected work on hand.

The train wire is of first importance, and must be made good, if needs be at the expense of everything else. The through quadruplex wires are of next importance. After locating and patching trouble out of a circuit, it should not be again disturbed until it is known that the trouble has been removed. When the trouble is reported clear, or lineman asks for a test, the through circuit should be left intact, and the section where the trouble existed tested by using a local circuit and getting both patch offices in; then if found clear, the lineman should first be advised.

If a quad wire, the offices having the quad sets should be notified in order that a new balance can be taken, if necessary. The taking out of fifty or seventy-five miles of iron wire from a copper circuit often working on a very narrow margin may so affect the balance as to make the wire almost unworkable.

In order that there may be no delay in clearing wire trouble, it is necessary for the Wire Chief to at all times know the exact location of his Division Line Repairer. Early each morning, say 7 A. M., each Line Repairer should file a work report giving movements for the day, stating explicitly just where he will be, and on what trains he will move, if away from headquarters, advising the Wire Chief immediately of any change in his plans.

In case of unusual conditions prevailing, Wire Chiefs should be authorized to direct the movement of construction or repair gangs, as communication with the Superintendent's office may be entirely cut off by wire trouble at any time.

In case of a sleet storm, or any unusual interruption affecting all wires, so as to cut off communication with the general office, each Wire Chief should immediately advise his Superintendent fully of the conditions on his own district, and continue to do so at intervals until communication is again restored, using Western Union or Postal wires, if working. If all commercial wires are down, the telephone toll lines should be used, is available.

GENERAL REMARKS.

I have noticed a tendency on the part of some Wire Chiefs to discourage operators calling for a balance, which often results in operators working for some time on a wire almost unworkable, which could be remedied by a balance, and its capacity often doubled.

The third trick chief should, in addition to testing *all* wires early in the morning, carefully inspect his repeaters and quadruplex apparatus, especially the points of his pole changers and transmitters, and balance his quadruplex sets, for the reason that during the early hours of the morning, possibly only one or two corners have been in service, and the wires are too busy to be taken out of service for this purpose after the arrival of the first trick chief. While the use of files for cleaning points is very necessary at times, it should be borne in mind that a clean smooth point is by far more desirable than a clean rough one, or one with sharp edges or corners.

Once a week, all wires should be measured for insulation, and current strength of different circuits measured. Quad batteries should also be measured, compensating resistances of quadruplex sets adjusted, and a full report mailed to the Superintendent of Telegraph. For insulation tests, a battery of approximately one hundred cells should be used, all wires to be removed from this battery while being used for this purpose. The wires should be removed for the reason that otherwise the current strength will vary, being governed by the demands upon the battery, due to the opening and closing of the other wires.

In making insulation tests we use a battery of one hundred cells if available, or a current of 90 volts potential, inserting a voltmeter in the different circuits, having the distance terminal open the wire, noting and recording its deflections. If the needle shows an escape, intermediate offices are called in until the point of escape is located as nearly as possible. The lineman is then advised and instructed to report when covered. Upon receiving his report, the wire is again tested and the lineman advised of the result.

The current readings are taken by inserting a milameter in the different circuits while conditions are as nearly normal as possible. In this way, we secure a report showing the actual amount of current being furnished for the operation of each wire.

Mr. Camp: About thirty years ago when I first began testing wires I found when I told an operator to open a wire for a minute it was liable to be left open for half an hour. I began to think in what manner I could get over this difficulty, and came to the conclusion that instead of asking the office to open the wire I would tell them to try me on that wire. If I heard the dispatcher working with any office on the line I could test with that office. Or if a way-office was reporting a train I could take the test while he was reporting. Then you didn't have to wait a half hour.

In regard to taking wires out of the top of the switchboard, which has been referred to. If the wires are in cables and the cables are properly constructed you will never make a mistake putting the wires back in the proper binding posts.

Mr. Walstrum: I am opposed to the practice of taking wires from the top of the switchboard. The frequent changing of these wires breaks them. I think uniformity in placing wires in the switchboard is very important, as the testing man knows exactly where the wire is.

Secretary Drew: We have all had some laughable experiences in the matter of testing. Mr. Camp's experience reminded me of a case where we had an order to an operator to ground No. ', north. Well, it was probably a minute and a half before we heard anything from him. Finally he grounded it. The wire chief says: "What made you so long?" He says: "I didn't have any instruments cut in and I had to cut them in before I could ground them."

We also had a very laughable, and serious, case one time that came in a little ways out of Chicago. The trouble would come in about ten o'clock every night. It would disappear about five o'clock in the morning. We hunted and hunted for that cross and asked the operator at this station if he had any trouble on his switchboard. He said: "No, sir."

Finally, we slipped a man out there one night, after the thing had been going on four or five nights, and found the Irishman who had charge of the freight house had one of those old-fashioned long keys to lock the door, and when he got through at night and had locked the freight house, so as to have his key in a conspicuous place he hung it on the switchboard.

Mr. Van Akin: We had a case of trouble one time and it took two days to locate it. We put in a brand new switchboard in the office. A man went there and found there was no place for the wires to get crossed. I told him it was there. I sent another man out who came back with the same report. I went out myself, and wetting my fingers located the trouble due to varnish. There was no way to clear that except by taking the wires out of the posts.

Secretary Drew: I had an operator who was a very neat young man and disgusted with the appearance of his instrument table. He went down town and bought two yards of nice oil cloth. He took a whole Sunday to do the work. When we cut in Monday morning there was trouble. We asked the fellow what he had done. Everything was in fine shape in his office; he would like to have us come and see it. I sent a man to see it. He saw it very soon.

Mr. Chenery: I feel like apologizing at this time for my action as your former chairman. Perhaps I made a mistake in not listening to all the reports of the committees. We have two or three interesting reports, which should receive attention at this time, worthy of discussion. I move that before discussing the present paper further or listening to other papers that we hear from the committees.

Which was seconded,

And agreed to.

REPORT OF COMMITTEE ON WIRE CROSSING LEGISLATION.

Mr. Groce, Chairman, presented the following report:

Your committee on Legislation for Wire Crossings began to gather information relating to the laws in effect in the different states upon this subject soon after the meeting held at Denver in 1906. The correspondence upon this subject brought a suggestion from some of the Superintendents of Telegraph that a special meeting be held at Chicago of such Superintendents of Telegraph and others interested as could attend. A meeting was arranged and at that meeting the subject was discussed. At a subsequent meeting in Chicago it was decided that an amended copy of Michigan law No. 171, would probably stand the best chance of enactment. A title suggestion taken from the law of Wyoming was added, thus making the act one for the protection of trainmen: (See copy in circular in fore part of these minutes.)

As the Illinois Legislature was about to meet it was thought advisable to make an effort to secure the enactment of this legislation at that session. It was introduced as Senate bill No. 84. After its introduction it was referred to the Committee on Railroads and it has not since been heard from. The Legislature has now adjourned until next fall. The subject of Wire Crossing Regulations was also brought before the Legislature of Iowa during the session just adjourned and a law was passed empowering the Railroad Commission to prescribe standards of Construction and maintenance. The Commissioners have requested the Superintendents of Telegraph of lines in Iowa to attend a meeting to be held by the Commissioners during the month of July for the purpose of formulating such standards. It is recommended that those Superintendents interested post themselves as to the date of the meeting and attend prepared to offer suggestions.

Copies of the proposed bill was placed in the hands of representatives of the different Orders of Railroad Train Men and we were given the support of those organizations in our efforts to secure this legislation.

After the bill was introduced in the Illinois Legislature, our attention was called to the fact that there would possibly be some annoyance caused to the railroad companies if they should be compelled to apply to the Railroad Commission or some other State authority for permission to cross their own tracks. While it is possible that it would be of some advantage to have the bill changed, your Committee, however, thinks that whatever should be done in this nature the requirements should still cover a staandard of construction, that is, work done by any companay should conform to the standard required of other companies desiring to cross the tracks and telegraph lines of, or along, any railroad. To advocate the enactment of a law which would permit a companay to cross its own tracks or telegraph lines with a line of inferior or dangerous construction would place us in an inconsistent position. It may, however, be well to have the regulations stipulate that a road may construct a crossing over its own road or telegraph lines at any time by conforming to a specified standard. A discussion of this feature by the members of the Convention is recommended.

Your Committee is not now able to report on the legislation in effect in all States and Canada. Early in our correspondence we were advised that the Canadian Railway Commission had certain rules and specifications, but that they were to some extent insufficient for proper protection, and officials of the Canadian Pacific Railway Company's Telegraph were making an effort to have the existing rules amended. The result of those efforts is not known to the committee. Our information covers the following States:

MICHIGAN:—The law places the specifications for the construction of telegraph, telephone or electric wires of any kind, over steam railroads, under the control of the Department of the Commissioner of Railroads and it is our information that the provisions are adequate and satisfactory to the railroad companies.

ILLINOIS:—The owners of lines or cable over steam or electric railroads must maintain their lines not less than 25 feet above the surface of the rails. There are no other specifications.

Telegraph, telephone and electric light or other wires of any kind constructed over tracks of any steam road, shall be constructed in accordance with specifications given in the Act. The specifications are fairly adequate and seem to give the protection desired.

IOWA:—Previously mentioned.

MINNESOTA:—The law gives to telegraph and telephone companies the general right to string wires but nothing definite is specified for a standard of construction over crossings. Some more definite and specific standard is desired.

NEBRASKA:—The law gives telegraph and telephone companies rights for crossings and prescribes the standard height. It also prescribes for an agreement by contract as to the manner and kind of any such crossing. It provides for a means of arbitration in case of disagreement and in general would seem to meet requirements.

KANSAS:—Has a law placing the regulation and stringing of telegraph, telephone and electric light or other wires under the supervision of the State Board of Railroad Commissioners and that board has issued rules and regulations governing the construction and maintenance which are very fair and meet the requirements.

COLORADO:—Lately passed an act giving general rights for the construction of telegraph, telephone and electric light or power wires which are to be so maintained as not to obstruct or hinder the usual travel on such highways. Wires carrying an electric current of 5000 voltage, or higher, to be constructed under an agreement between the parties interested. The law provides for arbitration in case of a failure to agree. Adequate provision for a standard in the construction of power lines carrying less than 5000 volts or an ordinary telegraph and telephone line is not mentioned and something of this kind is desirable.

SOUTH DAKOTA:—The law grants rights for the construction of telegraph and telephone lines, but provides no standard and something further would seem to be desirable.

WISCONSIN:—Has a statute granting privileges to telephone and telegraph companies but no provisions are made for standard of construction or maintenance. Some such law would seem to be desirable.

KENTUCKY:—Statutes give rights for constructing and maintaining crossings but do not provide a standard for such construction or maintenance. A law of this kind would be desirable.

TENNESSEE:—Statutes give rights for construction and maintenance specifying that any line must not obstruct or damage highways, railroads, etc., but gives no standard of construction or maintenance. Something of this kind is desirable.

MISSISSIPPI:—Telegraph and telephone companies have rights to construct such crossings, the construction to be such as will not interfere with the running of trains or use of operation of telegraph lines. Some more definite standard of construction and maintenance is desirable.

LOUISIANA:—Telegraph and telephone companies have the right to construct and maintain such crossings provided that the ordinary use of the railroads and telegraph lines thereon be not thereby obstructed. No stanadard of construction requirements is given, which is desirable.

As the enactment of any legislation on this subject will necessarily have to be carried on in each state separately, it is the recommendation of your Committee that the Superintendents of Telegraph interested in each state move jointly in bringing before each State Legislature where the laws do not now offer ample protection, an act such as the one which was introduced in the Illinois-State Senate as Bill No. 84, or some such modification of this act as may seem desirable to the members of this association. It is also believed that the members of the different train mens organizations can be of great service in securing the enactment of such a bill and it is recommended that they be called upon by the Superintendents of Telegraph or some other proper official of the Railroad. One of the railroad systems with which a member of your Committee is connected had 10,000 copies of a circular printed quoting the bill which would be presented to the State Legislature, setting forth its aim, and requesting in the same circular, over the signature of the General Manager, the co-operataion of those interested. We believe that this is a good plan and further action of a similar kind by Companies interested is recommended.

All cities have laws governing the wiring of buildings for electric service of the various kinds and many of them have regulations for pole line construction where heavy currents are used. The rules of the National Board of Underwriters have become a force equal to law of the land. The object of the legislation which we hereby advocate is of equal importance and there is no doubt but that every legislature in the land would meet the requirements if the question were as well known generally as are the objects of the National Board of Underwriters Rules. The opposition found to any legislation favored by Railroad Companies or Telegraph Companies in certain States would surely not exist in the case of this Wire Crossing Legislation if the facts were known. It possibly seems to the layman that no person would deliberately construct and maintain a dangerous crossing, and this may be true, but many people do not fully appreciate what is dangerous, nor do they appreciate the extent to which a Railroad Company or Telegraph Company is hampered in the performance of its duties to the public by the interference caused by interruption in telegraph and telephone service.

A company, or some individual, desiring to build a line at small cost is given the right by law to construct over and across a railroad at a public crossing. In hundreds of cases no attention is paid to the line after construction until it falls down, and in many cases of cheap building the fall comes soon after the construction. It may be said that the Railroad or Telegraph Company which is crossed and which suffers from the break may have recourse by bringing an action for damages, but this, at best, is locking the stable after the horse is stolen, and in addition, in many cases, nothing could be recovered if suit should be won. Crossings made at places which are not public highways are of course different and can be controlled. In general, we believe all companies have this latter class of crossings in hand and allow them only under contract.

Since experience has shown us that we cannot enforce proper construction and maintenance under present conditions, in many states, we therefore recommend that this Association endorse the actions towards securing just and equitable laws and that the individual members work to that end.

Mr. Groce: Just before I left Chicago I was reliably informed that our bill in Illinois had been opposed by the Western Union Telegraph Companay. I did not have time to take it up with them but I have understood that they look with disfavor on any legislation of this kind simply for the reaeson it might retard them in some immediate construction work. I think, however, they realize as well as any other company the importance of something of this kind. Your committee in considering this subject did not dwell largely upon the high potential line crossings. The interests represented in the different legislatures seems jealous of anything at all of this kind brought up, and it was our opinion that a simple law that would place in the hands of the constructing company power to enforce some good and safe construction would be better than to have any extended construction standards.

Since arriving at the meeting, Mr. Fry has placed in my hands a paper to which is attached the printed act sent out by the secretary of this association, which is identical with the act I have just read.

The Ill. Central started last fall and made a record covering about six hundred miles. I haven't got the figures at hand, but it was somewhere near seven hundred and fifty crossings, 60% of which were of fairly safe construction and 40% absolutely dangerous. About four months ago we had a case where a power company carried a line of four thousand volts over our telegraph line, and one afternoon it was thrown on to our wires and the current carried eight miles, burning up a depot and $12,000 worth of freight, and went the other way and damaged our big terminal switchboard at the New Orleans office.

We have had on our line two cases where linemen were seriously injured where the crossings were quite a distance off. The men working on telegraph lines with no crossings in sight are very apt to forget these things. One was killed and the other seriously injured, and the city electrician was seriously injured in one of the cases. This would appear to me to be a good basis of argument in placing our legislation before the different states. The annoyance caused by these interruptions we all know are great. We have on an average one case of trouble every day of the year by telephone wires coming down across our wires.

The report does not cover the entire United States for the Committee did not have time to take it up and carry it out. We figured this report would show, in a measure, the conditions and the way we are compelled to handle them. Then, the members in the states in which legislation is desired, are better posted and have a better way of getting the facts.

Sometimes legislation is passed as has been passed this year that we know nothing about.

Mr. Ryder: Certainly no more important subject can come before this association. I move the report of the committee be accepted, spread upon our minutes and the committee continued, my idea being it will be the duty of the committee to endeavor to interest or keep up the interest of the various Superintendents and try to get permanent legislation in the states. During the past winter the anti-railroad feeling existing through the country hampered our efforts very seriously, and in a great many states practically no effort was made because we realized anything that the railroads might want would be the very thing they would not get. Now that feeling is changed somewhat and I believe we can secure this legislation in the future if we keep at it. We won't get it unless we do.

So far as the telegraph companies were concerned there was some feeling on their part against legislation. But I am inclined to think it is more local than general, and hinges partly on the idea that they would be hampered in making quick movements sometimes. But I don't believe there would be any trouble of that kind. That is, when they have to seek permission from a railroad commission or others, the railroad company will be in a position to help out a matter of that kind.

Mr. Chenery: I think all things considered the committee has done remarkably well. No tangible steps were taken to secure legislation until since the last meeting, in Denver. At one of the meetings in Chicago this matter was brought out and a circular embodying our recommendations sent out. Therefore, I think we have started something and ought to keep it up. I shall be very glad to second Mr. Ryder's motion, that the thanks of the association be tendered the committee and the committee be continued. Before a general discussion is had on this matter I think it would be well for the convention to listen to Mr. Fry.

The motion was agreed to.

Mr. Fry: It was necessary for me to appear before the legislature of Minnesota. Not having been previously advised as to the necessity of my appearance there it was rather sudden and made it necessary for me to look for some ammunition. I could not think of anything better than to try to discover why it was that after having gone over our entire system and taking measurements we found wires which were at the legal height of twenty-two feet which in six months after were eighteen or nineteen feet above the rail. I made a stand on the matter in Minnesota, and not being well informed as to what would occur I said I thought in the event of a pole leaning 6 inches that would give a drop of 3 or 4 feet in the center of the span. I haven't worked it out. When I went to Wisconsin I found there eight or ten telephone companies objecting to the bill. After having gone into the matter further, by making actual tests, I secured some very bad figures. After getting the figures from the engineer I presented them to my friends and they agreed with me that something was necessary. Feeling I could do more with them by falling in line, the telephone company having brought me a law, after looking it over I thought it was as good as any we could get.

(With the aid of a diagram Mr. Fry showed his method of obtaining figures, and presented the following as the final result):

Test dip and theoretical dip at center of a 100 foot span of wire by the insertion of slack as indicated, the original dip when the wire is taut being 2 inches below the level.

Slack.	Test Dip.	Theoretical Dip.
2 in.	1 ft. 11 in.	2 ft. $1\frac{1}{32}$ in.
4 in.	3 ft.	3 ft. ¾ in.
6 in.	3 ft. 9½ in.	4 ft. $4\frac{1}{32}$ in.
12 in.	5 ft. 7¼ in.	6 ft. $1\frac{11}{16}$ in.

This means if you have a pole on both sides of the track, improperly guyed, one pole leaning 6 inches you get 4 feet from the center of the span. If 150 feet span the fall in the center of the span for a 12 inch slack would be 7 feet 6 inches. If a 200 feet span the fall would be 8 feet 6 inches for 12 inch slack. I have a little formula if you wish to determine just what the proper drop would be.

Mr. Chenery: I think the argument of Mr. Fry shows conclusively the necessity for legislation, and I recommend these figures be printed in the minutes—the secretary has anticipated me—with the discussion.

Secretary Drew: In a great many instances motions are made that matters be printed in the minutes. It is unnecessary for everything will appear in the minutes.

Mr. Fry: In presenting these figures I want to say there are few men who appreciate the danger of one inch of slack or the leaning of an inch of a pole improperly guyed.

Mr. Van Akin moved a vote of thanks be tendered Mr. Fry on his talk,

Which was seconded,

And agreed to.

Mr. Dailey: There is one thing we must not forget. The majority of the state legislatures have adjourned and will not meet again for two years. I assume we cannot do anything before two years.

Secretary Drew: There is one little point I have thought of that, I think, we could use to good advantage. That is, if we will interest our trainmen. Some roads have been careful to do that. The legislators seem to think more of the trainmen than they do of the rest of us and they will do more for the employees than for the officials. These men are directly interested, because we know every once in a while one of them gets pulled off a freight train and is mained or killed. The engineers themselves run into these wires sometimes with their engines and it causes them a good deal of trouble. If we can interest our employes in the operating department you will find these fellows can drop a word or two that will be heeded and heeded a good deal more than something we may say. They are afraid of these fellows because they all have a good command of votes good many more than we do, and they will do it for them when they will not for us.

Mr. Ryder: There is another piece of ammunition that would have a good deal of weight with legislators, and that is to have a few pictures of some of the wire crossings that we all have. Of course, it would be perfectly proper to pick out the worst ones. But I think we all have in mind crossings the pictures of which would speak for themselves.

Mr. Davis: I move that the minutes of the executive session be printed and distributed to the members within thirty days and that the minutes of the open session, also, be printed and distributed within thirty days, and that the

Secretary be empowered to employ a sufficient amount of additional help to enable him to do this, and that the members be assessed a sufficient amount pro rata to cover the expense.

Which was seconded.

Secretary Drew: I would like to talk on that motion. In the first place the minutes of the executive session we hope will be distributed to each member inside of fifteen days. The stenographer and myself have got together on that project.

As to the minutes of the regular session being printed inside of thirty days, there are some features that prevent us from doing that. In the first place, we depend, as you know, largely upon the advertisements to cover the expense of these minutes. Our advertising friends all want more or less time to prepare their matter. I write them just as soon as I get home, and sometimes it takes three or four weeks before they prepare their matter and get it to us ready for the book.

Another thing. To get up this book is no small job, and it is something that one man has got to do. You cannot put somebody else on and let him help you. You have got to do it yourself if you want to get it up right. The first thing we do is to get the galley proofs of the minutes. These are cut up and sent out to each member for revision. There are few men who say exactly what they mean in an impromptu speech. When they come to see it in cold print they want to make some little correction, alteration or addition. We give those who take the principal part in these discussions an opportunity to do that. That is of very great advantage in giving us correct minutes.

Now, that takes time. Some of the men to whom I send these with the request to please hurry them up don't return them for three weeks. What are you going to do? You cannot go ahead and print and say we will let him stand for what we have got. That won't do. So that accounts for an apparent delay in the minutes. It would seem as though it were an easy matter to get these minutes out in thirty days, and if any of you want to try it I will be very glad to turn the job over to you and let you see what difficulties you run up against. The minutes are gotten out just as soon as these various hindrances—many of which the secretary is not responsible for, I assure you—can be overcome. The minutes are not in my office twenty-four hours before they are mailed to every member of the association.

So I hope that no such motion will be passed here today, because it is impossible to get these distributed in so short a time.

Mr. Rhoads: It seems to me it would be proper to say unless the proofs are returned in two weeks the minutes will be printed.

Secretary Drew: The galley proof proposition works very well, with this single exception: it does take time. With the long experience I have had I think we have just about got as near the thing as we can. There have spoken in this meeting at least thirty men. At least twenty of these men have got to have copies. Some have only said a few words, and, of course, I can go over that and straighten it up myself, but where one has talked quite a little while he wants to have his proof himself. He should have it and I want him to have it.

Mr. Chenery: With the assurance of the Secretary that the executive meeting minutes will be distributed in fifteen days and every effort made to get out the full proceedings as early as possible, I suggest that we leave the matter in the hands of the Secretary. In this connection, however, I would like to say this. I believe up to the present time the dues have been ample to take care of all printing, but, perhaps, we would broaden out a little bit. It occurs to me that the Signal Association, which has been set as a model for us, sends out a great deal of matter, and I therefore move that a separate copy of the report of the committee on wire crossing legislation and the discussion following be printed and istributed to the members, and, as has been stated, if the Secretary hasn't enough money to take care of this extra printing the association members be assessed pro rata.

Mr. Groce: I suggest that Mr. Davis change his motion. I believe it would be a good idea for us to have this report and the discussion printed in a separate paper, that several copies of the paper be sent to each member of the legislature in the states where we are desirous of a law upon this subject, and the association be assessed pro rata for the expense of having these printed. I want to ask that Mr. Davis make his motion read something in that line.

Mr. Davis: I will be very glad to withdraw my motion.

Mr. Taitavall: I want to add a word or two in defense of the Secretary. I think each man should receive a copy of what he has said. I receive letters saying: "Do you intend to print my article?" Sometimes I get fifteen or twenty corrections on one paper. That shows the necessity of going carefully over anything that is to be printed. I think the Secretary has adopted the right course.

Mr. Walstrum: In regard to this legislative matter, I do not think the association should furnish the extra copies. The railroads can have printed the extra copies and send them to the legislators. I think it should be handled in that way.

Mr. Dailey: I believe this matter has been submitted to all the legal departments of all the roads.

Mr. Walstrum: We don't want to print extra copies of all that has been said. If the railroad companies want to use them they should be willing to have extra copies printed.

Mr. Chenery: I think the gentleman is under a wrong impression when he speaks about enough copies to send to the various legislators. That is not the object at all. What we want is a few copies for our own use as a means of securing the co-operation of the legal department in securing this legislation.

Secretary Drew: Separate from the other which would be in the minutes. I think that would be an excellent plan, and I believe it can be done with but little extra expense. It would be easy to extract that, make an extra heading and put it in separate. I will do that without any further suggestion, and send at least six copies to each one with their minutes, which will, also, have it inside. That is a fine suggestion and I think we can do it readily.

President Griffith: The Secretary has promised to cover that. Is the motion before the house withdrawn?

Motion withdrawn.

President Griffith: It is getting late and we will proceed to the next committee's report. We have one on pole construction. Mr. Maver, the chairman, is not here. Mr. Ryder, I think you have the paper. Will you kindly favor us?

Mr. Ryder: There were no meetings held, as I understand it. Mr. Bristol did not do anything so far as work on the committee is concerned. Mr. Maver and Mr. Fowle had considerable correspondence upon the subject, the result of which was that Mr. Fowle got out a list of questions that the committee wishes submitted to the members of the Association, and from the answers a report can be worked up later. The questions are numerous and go into the proposition in great detail. I believe if these questions are submitted to the members and carefully answered the result will be worth the trouble. It all hinges, however, on the question of these answers being accurate. That means work for all of us and I think we ought to do it. I don't believe we should take up the time of this meeting to even read these letters. Let them go in the minutes with the questions. But I do want to make a plea for the presentation of these questions to the members and that they be given proper consideration.

REPORT OF COMMITTEE ON POLE LINE CONSTRUCTION.

Association of Railway Telegraph Superintendents.
Committee on Pole Line Construction.
Wm. Maver, Jr., Chairman.
136 Liberty St.,

Chicago, Ill., March 20th, 1907.

Mr. Wm. Maver, Jr., Chairman,
Committee on Pole Line Construction,
Association of Ry. Tel. Superintendents,
New York City.

My Dear Mr. Maver: Your letter of March 15th, 1907, has been received and noted. I gave some thought to this subject over a year ago and my experience of the past year has not changed my first idea, which I will try to give you briefly.

The telephone and telegraph companies can, of course, furnish much valuable information as to the construction and maintenance of pole lines, but the railway proposition seems to me to be an entirely different one from an economic or financial standpoint. The telephone and telegraph companies construct, operate and maintain pole lines for direct revenue therefrom, while the railway companies construct, operate and maintain, or lease and operate, pole lines and wires for the movement of traffic and for revenue only indirectly. That is, with the railways, communication is a source of expense and not of revenue directly. Therefore, the value of communication to the railways is represented by two factors, first the actual cost of providing it, and second, the losses occasioned by its interruption, such as overtime for train crews caused by delays to traffic and the losses in delays to traffic, reduced mileage per day of motive power and rolling stock, etc. That is, a conservative view of the matter seems to be that the railways can afford to invest in a pole and wire plant an amount which will provide the necessary communication and which will also construct a plant of such stability that the interruptions will be so few and infrequent as to occasion financial losses so small as to be much less than the total annual charges on the investment, at least.

Theoretically the proposition might be put in this way: Add to the total annual charges on the pole and wire plant the financial losses to the operating department caused by interruptions of communication and call this the total cost of communication. It is then obvious that as the investment in the pole and wire plant was increased, the interruptions due to weak construction would diminish. It would be expected, then, that an increase in the total annual charges (arising from better and more stable construction) would be accomplished by a decrease in the losses due to interruptions and a point of maximum economy and minimum total annual cost would be found, under any given set of conditions, which would determine the best character of construction which could be afforded.

This is doubtless a point of view which is somewhat academic, but it seems to me to furnish the best guide as to the procedure which should be followed. The Telegraph Superintendents are now in possession of information as to the standards of construction adopted by the telephone and telegraph companies, and I do not see very much to be gained by discussion of the matter, except to bring out the frequency and duration of wire troubles and pole failures in the various seasons of the year. The fact that so many of the railway companies are securing their telegraph facilities from the Western Union Telegraph Company, may create difficulty in going into the financial side of the question as it actually exists on such roads.

However, it has seemed to me that the committee could best get at the situation which confronts the Superintendents of Telegraph by sending out a circular letter in blank form, setting forth questions to which answers are desired, the information to be for the use of the committee in preparing its report. Such a letter could be drafted in a way calculated to bring out the facts as to present facilities and the cost of maintenance. I would divide the subject into Construction and Maintenance, going into details and costs under each heading; I would also endeavor to draw forth opinions as to the loss of revenue or increase of expense to the Operating Department, caused by interruptions such as ordinary wire trouble and complete line failures.

It seems to me that the committee would perform a valuable service in the gathering of these statistics and presenting them to the association with such discussion of the subject from a theoretical standpoint as might seem proper.

Kindly let me know whether my views are acceptable and what I can do further to assist and assume my share of the work of the committee. Yours very truly,

F. F. FOWLE,
Manager.

New York, April 5, 1907.

Mr. F. F. Fowle,
Am. Tel. and Telegh. Co., Chicago, Ill.

My Dear Mr. Fowle: I have read your remarks with much interest and while at first sight they might in parts, as you suggest, be considered as somewhat of an academic nature, yet when analyzed it will be seen that they properly arise from the proposition to improve the pole construction so that it will withstand severe storms, and of course as well the ravages of the elements generally. It is because loss of revenue follows loss of communication, and because expense for reconstruction follows collapse of lines due to weak construction, that improved methods of pole line construction along railways were suggested—hence the appointment of our committee.

If, as I think you intimate, the telephone and telegraph companies have now reached excellence in pole line construction, and it is only necessary for the railways, in order to reach the same state, to adopt the methods of those companies, there is perhaps not much left for our committee, as originally appointed, to do. It was my view, however, that owing to the fact that the railways control their own rights of way, and, as a rule, require for their own use comparatively few wires on their pole lines, methods to obtain more stable construction, might in their case be available, than is always possible in the case of telegraph and telephone companies. From this point of view I think it is a little unfortunate that there is not at least one railroad telegraph man on the committee, so that this feature of the case might be threshed out. In the instances where the W. U. Tel. Co. supply the wire facilities to the railroad companies, I suppose the pole construction is according to the best practice of that company.

I may say further that my idea has been that the loss of revenue due to, and the expense incurred by the frequent collapse of railway pole lines, occasioned by severe storms, are so evident that no discussion was required to demonstrate the facts. But the actual losses and expenses due to proposed plan, however, these losses and expenses would perhaps be brought home to the railway managers, and the wisdom of increased outlay to obviate or largely reduce these losses and expenses, would, it is assumed, be clearly indicated. I think your proposition is an excellent one, if it can be carried out. I have some misgivings that it will not be a very easy thing to obtain the data you have in mind. If, however, the plan should be followed, it appears to me it will involve a division of the committee's work into two parts. Firstly, an investigation as to the losses and expenses, as aforesaid, and (assuming that this investigation showed a necessity for improved pole line construction), secondly, the best method of pole line construction to effect the desired results, confining the proposition to railway lines exclusively.

I fear the preliminary investigation would consume more time than we have at our command, inasmuch as the Chairman of the Committee on Papers has informed me that all papers should be in the hands of the Secretary before the 15th of May. Perhaps, therefore, it might be as well to hold the matter in abeyance until the meeting, when the question of having a railway man or two on the committee, together with the new phase of the subject which your letter introduces, could be submitted, to the meeting, for consideration, and for further instructions. Kindly let me hear from you on these points.

I would add that if it should seem to you that there may be time for any report this year, I should be very glad to get a draft of such a letter to the Superintendent as you have in mind.

Very truly yours,
(Signed) WM. MAVER, Jr.

Chicago, Ill., June 10, 1907.

Mr. Wm. Maver, Jr., Chairman,
Committee on Pole Line Construction,
Association of Ry. Tel. Superintendents,
New York City.

My Dear Mr. Maver: Your letter of April 5 was duly received, but reply was delayed on account of the lack of time to prepare the list of questions which I had in mind.

This list I have now completed and embodied in the form of a circular letter, which is enclosed. The list is a long one, containing 92 questions, and it will require some time to obtain the replies. As the work of the Committee in digesting the replies will require considerable time and labor, I would suggest that the circular letter, if it meets with your approval, be submitted to the convention in June for the approval of the association, before we go further.

In framing these questions, I have tried to bring out the important points pertaining to line construction and maintenance as now practiced. Very probably some of the questions cannot be answered by many superintendents on account of the lack of data, but one purpose will still be served, namely, that the necessity of keeping maintenance records can be helpfully pointed out in our report.

I agree with you that the needs of the railroads from a telegraph and telephone line standpoint are different from the needs of the telegraph and telephone companies. The starting point seems to me to be the deficiencies of present practice; at the same time that we get these deficiencies. in reply to your circular letter, we shall no doubt learn much about types of construction which are giving every satisfaction. The work of our committee will naturally be of a confidential nature until the association publishes our report, if it so elects; I mention this in order that the point may be brought out in the convention, if you think it best, that all replies in the nature of personal opinions will be treated personally and grouped according to the views expressed.

I regret that I shall be unable to attend the convention.

However, I shall be glad to take up the work again if the association desires the committee to continue the subject.

With kind regards, I am, Yours very truly,

F. F. FOWLE.

New York City, June 1, 1907.

Supt. of Telegraph: Please answer the following questions regarding telephone and telegraph lines on your road, as fully as possible and give the information asked for, for the use of your Committee on Pole Line Construction. Return this circular, with your replies, to the Chairman before December 1, 1907. Yours truly,

Chairman.

(1) Date.....................

(2) (Name).......................Company.

(3) Furnish a geographical map of your system showing the location of the general offices, division offices and all stations; also the number of operating tracks on each portion of the road, the division limits and the territory included in each division and the principal mileages, giving the main line and branch line mileages on each division.

(4) In what States does your road operate?

(5) What is the character and the contour of the country traversed in each State? Is it mountainous, hilly or flat? Is it wooded or open? What portions are swamp lands?

(6) What is the character of the soil in each State? (Please go into this thoroughly, as it is important.)

(7) What is the climate in the several States traversed?

(8) In what months of the year do you experience sleet

storms in each State? How severe are these storms and what diameter of sleet commonly accumulates on your wires? Are such storms accompanied by high winds?

(9) In what months of the year do you experience snow storms in each State? Are they accompanied by high winds? Do you experience wet snow which clings to poles, cross-arms and wires?

(10) Are your pole lines exposed to unusual conditions which increase the liability of line failures? If so, please reply in detail, giving the conditions fully.

(11) Furnish a geographical map, in size the same as that prepared in compliance with question No. 3, showing all wires used by your company over its entire system in telephone and telegraph service, giving the following details.

(a) The territory included in each operating division.

(b) Copper wires and the gauge of each. (Give name and number of gauge.)

(c) Iron wires and the gauge of each. (Give name and number of gauge.)

(d) Steel wires and the gauge of each. (Give name and number of gauge.)

(e) Wires other than copper, iron and steel. (Give name and number of gauge.)

(f) The offices connected to each wire for testing purposes.

(g) The offices connected to each wire for operating purposes.

(h) Give the principal mileages on each division,—

main line and branch line mileages and the mileages between important stations.

(i) State the kind of service given over each wire.

(j) Show all aerial cables, giving the character and mileage of the same.

(k) Show all underground cables, giving the character and mileage of the same.

(l) Show where your wires leave railroad property, if they do so.

———o———

Your committee desires to avoid the appearance of attempting to investigate the subject of the mutual relations between the railroads and the telegraph or telephone companies as regards leased lines or reciprocal contracts. The foregoing questions relate only to wires used in railroad service, regardless of ownership and it is desired by your Committee that every road represented in the Association send in the data asked for above. In order to go further into the question, all roads have been divided into three classes, as follows.

Class A. Roads owning all poles and wires and leasing none.

Class B. Roads owning part of their poles, or part of their wires, or both and leasing the remainder.

Class C. Roads owning no poles and no wires, leasing all their wires.

Class A roads will be expected to answer the remaining questions fully; Class B roads only so far as their own poles and wires are concerned; and Class C roads will not be expected to answer at all. So far as Class B and C roads volunteer information in regard to leased poles and wires, the information will be considered by your Committee in its relation to pole line construction and maintenance.

Class A and Class B roads which own wires other than those used in the railroad telephone and telegraph service, such as signal wires or leased telegraph wires, will please include these wires in replying to this circular. Such wires should be shown on the map asked for in question No. 11.

(12) Is your road in class A, B or C?

(13) Class B roads will please indicate on the map asked for in question No. 11 the respective portions of their poles and wires owned and leased.

Construction.

(14) Give the number of poles to the mile now set in your lines. If this varies give the number per mile in each uniform section, naming the sections.

(15) Give the kind and dimensions of poles now set in your lines; total length, depth set in the ground, diameter at top, diameter at ground and kind of timber. If this varies, give the details for each uniform section, naming the sections. If special fixtures of any kind are in use, please describe them stating under what conditions they are used and where.

(16) Are any of your poles creosoted, painted or treated with preserving compounds? If so, state how many and where, giving kind of treatment.

(17) Give the dates on which your several sections of pole line were set. If they have been rebuilt since first constructed give dates when this was done.

(18) Were your poles obtained under specification and were they inspected before acceptance? If so, please furnish copies of specifications.

(19) Under what conditions as to curves and corners are your poles guyed or braced?

(20) How often and in what manner are your poles guyed or braced in straight sections of line?

(21) Are your poles raked on curves and corners? If so, how much?

(22) What kind of guys and braces are employed? Give tensile strength of guy strands employed.

(23) In what manner are guys and braces attached to poles?

(24) In what manner are guys and braces anchored or set in the ground?

(25) Give the dimensions of cross-arms now attached to your poles and the number of pins per cross-arm, with the distances between pins and the kind of timber. If these vary, give the details of each uniform section and name the sections.

(26) Are any of your cross-arms creosoted, painted or treated with preserving compounds? If so, state how many and where, giving kind of treatment.

(27) Give the dates when cross-arms were put up and if they have been replaced give the dates when this was done.

(28) Were your cross-arms obtained under specifications and were they inspected before acceptance? If so, please furnish copies of specifications.

(29) Are your cross-arms attached by lag bolts or

through bolts? If the former, how many lag bolts are employed? If this varies, give the details of uniform sections and name the sections.

(30) State the distance between cross-arm gains.

(31) Are cross-arm braces used? If so, give all dimensions.

(32) Under what circumstances are double cross-arms employed?

(33) What kind of timber was used for pins and was it treated? What kind of treatment?

(34) Give the kind of pin employed and its dimensions.

(35) What kinds of insulators are employed?

(36) Were pins and insulators obtained under specifications and inspected before acceptance? If so, please furnish copies of specifications.

(37) Were insulators subjected to electrical strain and leakage tests before acceptance? If so, please state details of tests.

(38) How many wires were originally erected on your pole lines? What kinds and gauges?

(39) What wires have since been erected and when? Give kind and gauge.

(40) What wires have been replaced? State which original wires were replaced and with what kinds and gauges of wire they were replaced.

(41) Were your wires obtained under specifications and inspected before acceptance? If so, please furnish copies of specifications.

(42) Were your wires subjected to tests of galvanizing,

tensile strength, elongation and electrical conductivity before acceptance? If so, please state details of tests.

(43) What amount of sag between supports was specified and used in erecting your wires?

(44) How are your wires tied to the insulators? With what kind of tie wire?

(45) How are joints in line wires made? Are they soldered? If sleeves are used, how many turns are given and what kinds of sleeves are in use?

(46) Were your lines erected under a general specification for pole lines? If so, please furnish copies of specifications.

(47) Are lightning rods in use on your lines? If so, state how frequently and how they are installed, giving details of earth connections.

(48) Are your lines protected at crossings with lines of telephone and telegraph companies? If so, please furnish descriptions of the kinds of protection in use, with diagrams.

(50) Have you records of the cost of construction of your lines, showing the initial cost and the cost of additions, extensions and replacements? Also the cost of erecting screens or other protection at crossings with the lines of telephone and telegraph companies and power lines? If so, please submit a statement of the same in detail, giving the initial cost and the cost of each addition, extension and replacement, separating the total cost into labor, materials, freight, traveling and supervision.

MAINTENANCE.

(51) Have you an organization for the maintenance of your lines?

(52) What official has charge of this organization?

(53) Of how many does this organization consist and what are their duties?

(54) Give the location of your testing offices and the distances between them.

(55) How frequently do you make periodical wire tests, between the offices last mentioned, to ascertain the condition of your wires?

(56) By what means do you ascertain the location of wire trouble?

(57) How many linemen do you employe to clear wire trouble? Are these men assigned definite portions of line in which they clear the wire trouble? If so, please give the sections assigned to each lineman.

(58) Do the linemen last mentioned also keep up the general maintenance of lines, such as replacing tie wires, insulators, joints, pins and cross-arms, pulling slack, trimming trees and foliage, clearing kite strings and dead limbs of trees, tightening slack guys, inspecting cable boxes, lightning arrestors, fuses, soldered joints and bridle cables, etc.? If the linemen are not assigned to the work, state by whom it is cared for.

(59) How frequently are periodical inspections made of your lines to ascertain their general condition and to note the manner in which work such as mentioned above in No. 58 is performed? By whom are these inspections made?

(60) By what means do you determine the necessity for replacing poles and cross-arms? Please describe this in detail.

(61) How frequently do you inspect your poles and

cross-arms, by the means described in reply to No. 62, to see whether replacements are necessary?

(62) How do you handle replacement work? Do you take care of it with your regular force or do you organize a temporary force for the purpose? In the latter case, under whose direction is this force placed?

(63) Do you keep records of wire trouble, noting location, time reported, time cleared, cause and time occupied by lineman in clearing same?

(64) Do you compute, for each month, the total possible wire-mile-hours of service if there had been no wire trouble and compare with this the wire-mile-hours which were lost because of wire trouble? If so, please furnish the figures for the past 10 years, if available.

(65) Do you keep records of pole line failures, noting location of failure, immediate cause, time failed, time service was restored, number of poles down and the weather conditions? If so, please give the above details of failures for the past 10 years and the dates on which they occurred, the age of the poles, whether failures occurred on curves or tangents, state how the poles were guyed or braced and give the direction of the line by points of the compass.

(66) Can you state whether the above failures could have been prevented by setting poles closer together, by poles of larger diameter, by shorter poles or by additional guys or braces? If so, please specify what would have prevented each failure.

(67) Do you keep your records of wire trouble, mentioned in No. 63, classified according to different kinds and gauges of wire and do you compute the number of troubles per mile of wire per month for each kind and gauge of wire?

If so, please furnish the figures for the past 10 years, stating the ages of the different wires.

(68) Can you state whether the frequency of wire trouble, referred to in No. 67, could have been reduced by stronger wires, shorter spans and more sag or dip of the wires between supports? If so, please state specifically what measures would have reduced the wire troubles.

(69) Do you make periodical resistance measurements of iron and steel wires to know their condition and determine their rate of depreciation? If so, please state how often and state the annual rates of depreciation of such wires on your road, for each kind and gauge.

(70) Have there been occasions when service was totally interrupted by wire failures, although no poles were down or broken? If so, please state the dates of such failures, lengths of interruption to service, immediate causes and weather conditions.

(71) Could the failures mentioned in No. 70 have been prevented by any of the measures enumerated in No. 68? If so, please specify as in No. 68.

(72) Do you keep records of the cost of maintenance? If so, please specify the manner in which they are kept.

(73) Can you state the total cost of maintenance per annum, dividing this total cost into the cost of wire testing, the cost of clearing wire trouble, the cost of the general upkeep and inspection of lines, the cost of making replacements, the cost of repairing line failures mentioned in No. 65 and No. 70 and the cost of making line alterations or changes in location which are charged to maintenance? If so, please give the figures for the past 10 years.

(74) The totol cost of maintenance will vary with the

number of wires on the poles, the number of poles per mile and the age of the line. Can you further divide the costs asked for in No. 73, into the figures for each uniform section of line, so that conclusions may be drawn between lines carrying different wire loads? If so, please give the figures for the past 10 years, naming the sections.

(75) What is the most economical line to maintain on your road, considering the total maintenance cost per mile of wire, as regards the size of poles, the number of poles per mile, the amount of guying and bracing, the number of cross-arms, the number of pins per cross-arm, the kind of timber used for poles and cross-arms, the sizes of wire and the kinds of wire? Where is this line located?

(76) Have you had any experience with poles other than timber, such as steel, iron or re-inforced concrete? What can you say regarding their first cost and cost of maintenance?

(77) Have you tried any means of preventing decay of poles at and just below the ground line? If so, what can you say regarding their cost and their effect on depreciation of poles?

(78) Do you bank earth or stones around your poles and why?

(79) Is it the custom of your road to charge the telegraph department with the overtime of train crews caused by delays to trains which result from failures of the telegraph lines? If so, can you state what this has amounted to, each year, for the last 10 years?

(80) If this amount were capitalized at 10%, would it, if invested in stronger lines, have prevented the line failures which occasioned the delays to trains?

(81) Are accounts so kept on your road that the different items entering into the cost of line maintenance can be obtained from the Auditor, or is it necessary for you to analyze the Auditor's accounts in order to arrive at these items?

(82) Do you consider that your expenses for maintenance are such as to secure the best results? Should they be increased or diminished?

The recommendations of each Superintendent of Telegraph are desired as to whether the lines on his road can be so improved upon as to reduce the cost of furnishing uninterrupted service, taking into account the reduction of overtime payments to train crews by providing continuous telegraph and telephone service. It is desired that each Superintendent give his recommendations below, in detail.

(83) Size of poles and kind of timber, for lines of 1 to 40 wires; depth set in ground.

(84) Number of poles per mile.

(85) Size of cross-arms, number of pins, kind of timber, treatment for preservation, through bolts or lag bolts, and whether braces should be used.

(86) Amount and kind of guying and bracing on corners, curves and tangents; amount of rake to be given to poles on corners and curves.

(87) Kind of pins and insulators; kind of tie wires and joints.

(88) Kind and gauge of line wires; tensile strength and elongation. Amount of sag to be given in spans varying from 50 to 200 feet.

(89) Should protecting screens be installed at crossings with telephone, telegraph and power lines?

(90) What method should be adopted for inspecting poles and cross-arms to determine when replacement is necessary?

(91) In what manner should the accounts of the Telegraph Department be kept to bring out clearly the several items in the cost of maintenance, so that the Superintendent can handle the maintenance most economically?

(92) Do you favor the arrangement of having the Telegraph Department charged with the extra expense incurred by the Operating Department on account of interruptions to the telegraph service caused by line failures?

Signed.............................

Superintendent of Telegraph.

President Griffith: This is a very interesting paper and certainly requires consideration which we haven't time to give it. It might be wise to simply have it printed in our minutes where we can study the questions carefully.

Mr. Groce: I move that the paper, including the questions, be treated as the report of the committee on wire crossing legislation and sent out to the members with that. As I understand it it will not be a very arduous task because it is in such shape it don't have to be submitted for correction or anything of that kind. Each member can then make his report as soon as possible after receiving the questions.

Mr. Chenery: This committee will be continued, as I understand it, and, before they can make their final report they must have replies to the questions submitted. This committee wants something to work upon. I, therefore suggest that we have this printed separately.

The motion as made by Mr. Groce was seconded,

And agreed to.

Secretary Drew: Before the last committee, of which Mr. Davis is chairman, reports, by request of those who are here and have written papers, realizing where we are at, I would suggest these papers be simply published without being read: "Standard time," by W. J. Camp; "Error Sheets," by R. L. Logan; "Railway Telegraph Service," by W. J. Browne; "Visible Supply of Telegraph Poles," W. W. Ashald; "Uniformity of Office Installation," by E. Parsons. I move these papers be put in the minutes without being read or discussed at this time.

Which was seconded.

Mr. Ryder: It does seem to me it is too bad to call on the members to prepare papers and then have them go by the board as this motion proposes.

President Griffith: You must bear in mind this is at the request of the writers.

Mr. Ryder: That is due to their modesty, I am sure.

Mr. Dailey: Are we to have an afternoon session?

President Griffith: I believe it is the wish of many to go away on the afternoon train. If we have an afternoon session there will be almost none present.

Mr. Groce: I endorse Mr. Ryder's sentiment. It might be well to ascertain how many would stay and continue the meeting this afternoon.

Secretary Drew: I have to smile every time I hear anybody say anything about things being rushed through. If you will find an association of railway men, or any other men, in the United States, that has given more hours to actual discussion and listening to papers than we have done at this meeting, I will be willing to take a back seat and say that we are certainly rushing things. But, until you can show that, I think it is quite to the contrary. We haven't rushed things. The Car Service Association, of which I am a member, doesn't begin to put in its two sessions in the year, the number of hours that we have put in at this meeting. But it is easy to understand, to a certain extent, for their work is done by committees. Everything is referred to committee. The committees meet and thresh these things all over, and when they come to the meetings they simply present the recommendations and that ends it—very little discussion on the floor. I think it is a mistake to do it that way. I think we do it in a much better way and get more information in regard to the various topics that are brought up. But there is a limit. There is an eight hour law in this country. The first thing you know some of you fellows will be fined if you don't quit going at this pace. As two of the men are here and have made this request, as three are not here but have simply sent papers, as many members want to leave on the 2:15 train and others on the 4:45, it seems to me it is certainly very reasonable that we take these papers and publish them in the minutes without their being read at this session.

The motion to print the papers without reading, was agreed to by the following vote:

Yeas	9
Nays	5

STANDARD TIME.

By W. J. Camp, Electrical Engineer, Can. Pac. R'y's Tel.

The subject of "Time" is one which could, in the hands of a good writer, be made very interesting if followed up from the earliest days; but as this Association is more concerned in the present requirements than in ancient history, I will not take up your time in tracing the various systems in vogue since the creation for determining the divisions of the day.

A vital necessity in the safe and efficient handling of trains, is that all clocks and watches must indicate uniform "Time." Many serious accidents have resulted from a difference between the time-pieces of two employees, and, during the last few years, most of the railway companies on this continent have spent a great deal of money towards securing uniformity throughout their systems.

The Canadian Pacific Railway Co.'s management recognizing the great importance of a uniform Time system, has established a Time Service Department under the supervision of Mr. J. J. Houghton, to whom the writer is indebted for a large part of the matter contained in this paper.

The daily transmission of Time signals is looked after by the Telegraph Department, and the following description of the method may be of interest. On account of the very long circuits worked, it has been found best to transmit the signals by hand. At 11:53.50 the preliminary caution "Bk Time" is given by Montreal on all duplexes and half quads over which it is desired to send the signals, as a warning to the various repeater offices to cut in their combinations. The single wires are then cut in at Montreal and other points are switched on, and a second warning of "Time" is given, then single beats are made corresponding to the swing of the main clock pendulum, by alternately closing and opening the circuit each second; the beats are therefore one second in length. These are continued until 11:54.50 when the circuit is left open for ten seconds. At exactly 11:50.50 a long double beat is given and continued each alternate second until 11:55.50 when another pause of ten seconds is made and at 11:56.00 a double beat completes the transmission.

The repeater arrangements at Montreal consist of five relays of 75 ohms each connected up in series with an ordinary Morse key in a ponk circuit. The lead from the local dynamo to the desired duplex and quad tables passes through the contact points of one relay. By means of the loop switch any duplex or half quad can be thrown into the combination. The positive and negative 130 and 200 volt dynamo leads pass through the contact points of the other four relays to the various single wire—a by-path is provided so that any leased or other wires over which "Time" is not to be sent can be switched out of the combination.

The sparking at the relay contact points is almost nil, but should it become too great by adding more circuits, a small condenser would reduce it. A similar arrangement is used at all repeater offices where storage or dynamo current is employed, the pony circuit being worked by the relay on one of the incoming circuits.

At points where a repeater office is equipped with gravity battery there is seldom more than one or two side lines to connect up for time and in these cases an ordinary relay is employed for each of such lines. The combination at the various repeater offices are made up at 11:30 or even earlier, but the pony circuits held closed by a button switch until the warning signal is received from Mnotreal, when it is only a moments work to turn the switch and throw into the "Time" circuit all wires on which it is desired that the signals be sent.

C. P. R. time is regularly forwarded to Fanning and other islands in the Pacific Ocean and to Bermuda, Jamaica, and the Azores Islands in the Atlantic. Officers on vessels of the British navy frequently check their chronometers with this time at Vancouver, B. C. and Halifax, N. S., and of the Germany navy at the Azores.

A few words as to the accuracy of the "Time" may be mentioned here. Some years ago a long series of observations were carried on by astronomers of the Dominion of Canada and Great Britain and signals exchanged over the wires of the Canadian Pacific Railway and cables of the Commercial Cable Company. An astronomer was located at Montreal, one at Canso, one at Waterville, Ireland, and one at Greenwich. Each astronomer was stationed at each of the above points in turn, in order to eliminate the personal error. Signals were exchanged in each direction giving the transit of various stars over the meridian. Finally the land lines and cables were connected through repeaters and signals exchanged both ways direct between McGill Observatory, Montreal and Greenwich, as a check of the preceding results. From these observations was obtained the true longitude of Montreal. I believe that afterwards Washington, D. C., and various other points on this continent checked up their longitude with Montreal.

A master clock at McGill Observatory sends out signals over a circuit connected with an ordinary sounder in our main office. This clock is closely regulated by a siderial clock at the observatory which in turn is frequently checked up by observations of the stars.

We have on several occasions noticed that the "Time" given over the railroad lines in the United States has been as much as three seconds in error. We are satisfied that our own standard was right from the fact that the reports from the various comparison clocks on the system showed a uniform variation while the signals coming in over the N. Y. C. R'ys wire jumped two or three seconds in one day coming practically into unison with McGill.

Comparison clocks (No. 17 or 18 Regulator Seth Thomas) are located at all divisional points. At all comparison stations a daily record is kept of the clock variations and a report sent to the Chief Inspector at the end of each month. This report shows the seconds fast or slow and when the clock is wound, set or regulated. Each month these reports are checked up and the average weekly rating ascertained from which a statement is compiled and a copy sent to each Master Mechanic, Superintendent, General Superintendent, the Vice-President, and General Manager. The time inspector visits every station from one to three times per year and checks up the handling of records. All way stations are supplied with a standard telegraph clock (Seth Thomas), variations are recorded daily in same manner as comparison clocks.

Watch Inspectors are located at all divisional points. They are practical watchmakers doing a regular business with the general public. It is their duty to see that all Train Masters, Road Foremen of Locomotives, Locomotive Foremen, Road Masters, Bridge and Building Masters, Engineers, Firemen, Conductors, Train Baggagemen, Brakemen, Yard Masters and Yard Foremen carry watches up to the required standard and that the watches are regularly cleaned. For this purpose the Inspectors are advised by the proper official of the railway of all changes in the staff of the above mentioned employees.

The minimum standard of excellence adopted is a grade known among American movements as 17 jewelled, double roller escapement, Brequet hair spring, patent regulator, adjusted to temperature, isochronism and at least five positions, and corresponding to Waltham Appleton Track & Company "Nickel Premier"; Ball, "Official Standard" 16 and 18 size; Elgin "B. W. Raymond nickel"; Hampden "New Railroad"; "Illinois Bunn"; Hamilton "936", and all grades equal or above, also Swiss movements complying with these specifications, the variation of which must not exceed 30 seconds per week.

Watches which were in service prior to the reorganization of the "Time" service, October 1st, 1899, may remain in use subject to the approval of the Chief Inspector as based on the record of their performance, or on actual test in his office of their reliability. Almost every one of these watches had been removed from the service.

Employees required to carry standard watches must submit them for half-yearly inspection to the Time Inspector of his division, and receive a certificate that it is satisfatory, a copy of which is forwarded to his superior officer and duplicate to the Chief Time Inspector. In addition to the half-yearly inspection, employees must submit their watches to the Inspectors for comparison with standard time within the first and third weeks each month, and the

Inspectors keep a record of the rating. Failing to make such comparison the employee is not eligible for duty without an order from his Superintendent. No charge is made for these comparisons. Cards for keeping record of these ratings must be carried on the person subject to inspection on demand of a superior officer. Employees must not set or regulate their own watches, unless a watch stops through neglect to wind it. Watches must be cleaned at least once in fifteen months. The rate card must be filled in, in the presence of the employee who is required to initial the corresponding entry in the Inspector's rating book.

When a watch is repaired or cleaned by other than an inspector, it must be submitted to the Inspector for approval before being used in the service. When left with an Inspector for cleaning or repairs a standard watch will be loaned to the employee free of charge until his own is returned to him.

Inspectors are required to have a thoroughly accurate seconds pendulum clock and must ascertain the error thereof to the nearest second at least once each day by comparison with the Standard "Time" sent over the company's telegraph wires. A local circuit is extended from the contact points of a telegraph relay in the station to each Inspectors place of business for this purpose. A similar circuit is provided for round houses, etc.

There are a number of rules and instructions to the Inspectors regarding cleaning, etc., which it is not necessary to mention here.

This company has only installed electric clocks at Montreal and Winnipeg general offices and stations. At Montreal there are 81 clocks on five circuits worked by one master clock. These circuits obtain current from a small storage battery which is kept continually charged by a lead from the 25 volt local motor-generator in the main telegraph office a mile distant. The five circuits are worked in multiple from one pair of cells—I believe the C. P. R. was the first to work clock circuits in this manner. At Winnipeg there are 37 clocks on two circuits.

Results since the stablishment of the present time service have been very satisfactory. On one trip across the continent by the Time Inspector he found that the average variation of all comparison clocks was less than 5 seconds from Standard time.

ERROR SHEETS.

By R. L. Logan, Sup't. Tel'gh., K. C. S. Ry.

The Committee on Topics was evidently very kindly disposed toward the writer, judging from the subject assigned me, but I feel that there is very little out of the ordinary I can say which will interest you.

Error sheets occupy an important place in the Telegraph Company's Check Bureau, as they consist of differences in the "checks" of the office with whom business is transacted, and so little appreciated by the average recipient, who generally considers that he is being called upon to remit, or, as oft-times expressed, "donate" money to the Telegraph Company, whereas he is simply remitting funds no doubt collected, which he has had free use of for several months; as one of my former employees expressed it when called upon to remit for several deficits, "that he did not propose to furnish me with cigar money," but meeting him several years afterwards, stated that if I would send him the sheets, he would be glad to pay any amount of deficits charged against him, which he did promptly. On inquiry as to cause of his change of heart, I learned he had but recently joined the church and was endeavoring to live up to its teachings.

On receipt of sheets in question, it has been my practice to record them in full in book kept for that purpose, so as to be in a position to make up duplicates in case original becomes misplaced or lost, and not delay its investigation waiting for copy from New York. Attached thereto is the following instructions:

"Manager Western Union Tel'gh. Co.,

Dear Sir:—The enclosed Error Sheet for the month of ......, 190.., is sent to you for prompt investigation and adjustment. Business for the month during which these deficits occurred will be destroyed the 1st of ......, after which date original messages on which you are checked cannot be furnished. Therefore, unless this sheet is investigated promptly, you will be held responsible for the amount of the deficit, whether or not you were manager of the office at time deficits occurred.

Read the printed instructions on back of sheet, compare your records, and if they agree with what the sheet shows, and you are unable to locate in your files sufficient number of messages to agree with the other offices' checks, fill in the amount on card 47 enclosed, and mail to offices with whom differences exist. Make memorandum on separate piece of paper of the date on which cards were mailed, and if replies are not received in ten days time, notify this office, ENCLOSING A DUPLICATE POSTAL CARD, PROPERLY FILLED OUT, and I will obtain replies or relieve you of the responsibility.

If you are checked out before the investigation of this sheet is complete, turn it over to the incoming agent, with all papers and explain to him what has been done, and the necessity of its prompt investigation. Take his receipt for same and forward it to me.

I would advise making note of all correspondence regarding error and uncollect sheets, as it is a matter involving money and records should be kept of it, that subsequent managers may know what has been done, also make all remittances by Wells-Fargo & Co.'s Express, thus giving you a receipt."

Ten days after sheets have been forwarded (which are sent by registered mail, that those who may be so inclined, cannot claim that papers were never received), offices who have not up to that time mailed receipt cards, are requested to acknowledge their receipt. Twenty days after mailing, those who have not up to that date returned sheet, are notified that such and such error sheet is due in my office within ten days, and to please hurry its investigation and return. I find that this is a good idea as it never fails to bring in quite a number, complete, or practically so, accompanied by duplicate cards. The instructions attached to error sheet are rigidly enforced; those receiving same are held responsible for the full amount of deficit if not investigated promptly or before the business for the month in which it occurs is destroyed, whether they were manager at the time report was made or not, and I find that being thus called upon to pay one deficit of this nature is sufficient.

Uncollect sheets are handled practically in the same manner, excepting that instructions as follows are attached thereto:

"Manager W. U. Tel. Co. Office.

Dear Sir:—The attached uncollect sheet is on account of your not reporting properly messages sent collect, reported to you by service message as uncollected. Please observe rules 13, 58, 72 and 76 in Tariff Book and avoid such discrepencies in future.

Please return this sheet to me within Five (5) days, either fully explained or remitted, and oblige."

All error sheet inquiries received are forwarded, accompanied by an endorsement from my office, and is returned to the office or party from whom received in same manner; all endorsements being written in duplicate, which gives me a complete record of it, and when an office on our line fails to reply thereto before business is destroyed, the employees receiving same is called upon to remit for his negligence.

In conclusion will say that the instructions just received from the Telegraph Company that files be retained for eight months instead of but six will enable us to investigate more fully all deficits, thereby securing evidence in support of same so that collection can be made, when not explained, from whoever may be responsible. Heretofore, oftentimes error sheets were received only 30 days before business for that month would be destroyed, and while 30 days would be sufficient time if the office receiving them would handle as promptly as they should, and inquiries from other offices receive like attention, but so far I have been unable to conjure up any untried schemes or ideas that in any way would improve upon my present method in handling this important detail.

With all due apologies to my hearers (excepting the

Committee on Topics) and my thanks to our esteemed friend, Mr. ...... for his courtesy.

Very respectfully,

R. L. LOGAN, Sup't Telegraph.

RAILWAY TELEGRAPH SERVICE.

By J. C. Broune, Little Rock, Ark.

Foreman of Construction, Missouri, Pacific Railway Co.

In common with the duty of every head of a railway telegraph department, there is continued strife to sustain an organized service relevant to the demands of every official connected with the system. Making and maintaining a good service, is not any more confined to the ability of the Superintendent of Telegraph as a telegraph man, than it is to his support from subordinates. Capability is always successful to an extent, but when it is recognized and supported by an undercurrent of patronizing confidence, perfect attainment follows.

On most roads all messages filed by officials and their representatives are accepted without question as to indispensibility, or limit in the number of words, a condition that invites unceasing increase in the volume of business and diligent exercise in the most effectual method of handling it. On western roads especially, my observations have determined that the number of railroad messages and telegraph reports have gradually increased from year to year.

If for on other reasons, this condition is due to shortage of railroad equipment; the urgent need of keeping it in constant action, and the compulsory demands made upon railway officials by patrons to keep them advised of the whereabouts of every shipment, from originating point to destination. Modern railroad management keeps in closer touch with every detail of operation and maintenance, as also shrewd competition serves to nourish a legitimate increase in the number of messages handled, but the pernicious habit of using the wires indiscriminately in preference to the mail is never at a discount.

The excellence of every railroad telegraph service is confined to the befitting management of a certain number of the most important office on the system. The elements of an appropriate distribution of operating force, and the most useful arrangement of circuits, define triumphant administration. A pertinent inspection will disclose where the bulk of the business originates and through what offices it must pass. In instances the comparative few in number may be amazing.

Arriving at the ranking importance of each office, calls into action a distribution of force with all the best qualifications to perform the varieties of service at each station. It is true that many railroad systems are somewhat hampered in placing preferred men, by seniority clauses contained in approved agreements existing between the operators and the company; but it is contended that these seniority rules, as I have seen them, may be applied without forcing incompetent men into positions of importance. If the superintendent of telegraph creates these positions and arranges the salaries, seniority should be required to fully qualify, before a single position is filled.

Every telegraph office that is kept open under strained conditions, by reason of short or incompetent force, is a hazardous and expensive venture for the company; for as long as the wires are cut in at a station, dispatchers will depend upon making some use of the office, regardless of the efficiency of the operator employed, and to add to this, it may be truthfully said, from the significant to the most insignificant, every operator employed must be relied upon for competency and safe judgment.

Possibly "scarcity of operators" is caused by an effort tending to maintain too many offices, with a blanket allowance for telegraph service. If the necessity of the number of offices maintained were as constantly and carefully examined into, one by one, as the salary of each operator is checked monthly by the auditor's office, would not many offices be closed? and if, when these practically useless offices were closed, an amount of the money saved could be used in making salaries at other offices more attractive, would the shortage of operators decrease, and would the reliability of the service improve?

But the insufficiency of reliable and expert operators is one of the telegraph problems of today. An uninterrupted energy to improve mechanical equipment and to construct infallible lines has prevailed until our plant is about perfect for operation. Yet the operator remains answerable for the number of messages handled; the accuracy of execution, and the net profits to be derived from the expense of maintenance.

In general, with present office and line facilities, securing an adequate and competent force of operators to handle the existing and future volume of business, is more appealing than indulgence in inventive mechanism.

Telegraphy is only a temporary field for the entirely ambitious young man, many looking upon it not as a vocation to follow, but using it as a stepping stone for professions which offer quicker advancement to better pay. Nevertheless, the limited and deformed opportunities of today for learning the art, do not attract all of the better class of boyhood, and as long as these conditions continue, a large per cent. of the offices will be manned by a transient material made and picked up by circumstance.

We have our Eckert, Clowry, Edison, Barclay and Bristol who have crowned an imposing facility fitted to convey the rapid dialogue of commenrce, but the all-important genius is yet wanting who will originate a scheme, or a plan of discipline and instruction by which trustworthy operators will be made and supplied on demand.

THE VISIBLE SUPPLY OF TELEGRAPH POLES.

At the beginning of this paper, I desire to apologize to the Convention for the meagre details which I am able to present upon a subject which so closely concerns each Company here represented.

I accepted the assignment of the subject in all good faith, and hoped to secure a fund of information that would be of interest to each of us, but since April 5th, my entire time has been taken up with Committee work in the preparation of a Uniform Code of Train Operating Rules for the Railways in the Dominion of Canada, and my opportunities for collecting data upon the subject have been limited.

I assume that the conditions affecting the present supply of Cedar telegraph poles in the United States, are pretty generally understood by the majority of our members, but I shall endeavor to briefly cover the situation.

For many years the source of supply has been confined to the forests of Northern Michigan and Wisconsin. During the past ten years the demand has increased to such an extent that, estimating the future by the past, the present standing timber will be practically exhausted in the above regions within the next ten years, and as there is no other visible source of supply in the United States, it is a live question with all Companies to cast about for some sort of substitute. Already experiments are being conducted along these lines, and the Convention is to be favored with a paper upon this subject, which will be thoroughly appreciated by each member.

In view of the rapidly diminishing supply of Cedar in the United States we quite naturally turn to our growing neighbor to the north, a country which has but recently attracted the attention it merits, but which is now advancing by leaps and bounds. Wherever the railways go, the telegraph and telephone follow immediately, and poles must be provided.

I recently approached the Manager of the Grand Trunk Pacific Telegraph Company, to obtain the necessary data as to the conditions in Canada, knowing that he had but recently made an exhaustive inquiry into the subject, as he is commencing the construction of some five thousand miles of telegraph lines. To my inquiry as to the visible supply of telegraph poles in the Dominion of Canada, he replied: "There hain't none." However, he informed me that there are considerable quantities of Cedar standing in the low or swamp lands through Northern Quebec and Ontario, but that it is generally found in pockets and not over any considerable areas. The greater amount of this timber is found some distance back from present transportation facilities, but with the building of new railway lines, will be more accessible.

It is quite probable that the home demands will utilize the visible supply in Canada, as several thousand miles of new railways are to be constructed in the country within the next few years.

In view of the conditions as presented from the limited investigation that I have been permitted to make, I am convinced that the visible supply of timber for telegraph poles will have been used up within the next ten years, and that the future will provide the substitute.

W. W. ASHALD.

UNIFORMITY OF OFFICE INSTALLATION.

By E. Parsons.

It would probably be better, in considering the question of Uniformity of Office Installation, to view first the practice of non-uniformity.

It is too true that as a general proposition the style of architecture of our station buildings is not such as to allow, without considerable expense, much elaboration in the way of office installation. Do we, however, do all we can with the space and layout allotted? It would seem that a means of preventing the haphazard method of placing keys, relays, sounders and resonators, such as prevails, could be found.

Is it necessary to have incoming cables enter offices in so many different ways? It is a common practice to bring cables into offices at some point near the ceiling, but, as a rule, there uniformity ends. Some are left hanging from the point of entry, some are fastened to the wall by pipe straps, some by billet leather, some by marlin, staples or wooden or porcelain cleats. Some are brought to the right side, others to the left side of the board. In some cases all of the strands are placed in binding posts, if there are sufficient binding posts, in others only such strands are required for immediate use are placed in binding posts, while the balance are curled, tied or nailed up, or left hanging loosely. In some cases the instrument wires leading from the board are in cables, single wires tied together or single wires cleated to the wall in a manner suiting the taste of the installer. Relays, keys, sounders and resonators are placed, not always with a view of convenience as to work or space. but with an evident desire, on the part of the installer, to throw them in, in as short a time as possible.

In planning uniform installation of offices it appears desirable to divide them into three classes: One class to include all general and relay offices, another class combination relay and train order or relay and dispatcher's offices and the third the ordinary yard or small country office. It is easy to make an installation of the first class for the reason that one size table will do for any wire; unless a large number of blanks are handled the regular standard Quartette of Sextette tables can be used. The switchboard should be placed with a view of securing good light both at the front and rear. The cable coming to the office should terminate in some form of binding post so placed that the cable strands may be easily dropped to them in such a convenient manner as will allow the lacing of the exposed strands. We use what is known as a lock nut strip for binding posts. These strips are nothing more or less than binding posts mounted on a composition insulated base, two posts being mounted on one base. The two posts are connected by a brass strip the purpose of which is to allow a quick means of getting in on a wire for test or other purpose. The cable strand and jumper wire need not be molested when a wire is opened, all you do is to take off the strip. We place in a vertical row as many of these lock nut strips as are needed to take care of all the strands in the incoming cables; about three inches from this row we place another row, from which are run the wires to the lightning arrester. For this purpose we use standard fourteen gauge office wire as furnished by the Telegraph Company, lacing them on a made form to fit the dimensions of the work. We then have the wires from the outside ending in one row of strips and the wires to the lightning arrester starting from the other row of strips, located three inches from the first. All that is necessary is a small jumper to make the connection from one to the other and, if at any time, a change is desired, either on account of defective cable or on account of moving the wire to a new position in the board, all that is necessary is to take off your jumper wire and put on another. The cables coming in and the form leading to the lightning arrester need not be molested. The lightning arresters are placed in a row horizontally, so that the far end of the form previously mentioned will reach the fuse end of the arrester, thus bringing your line wire to the fuse before it passes the lightning arrester. From the lightning arrester end of the fuse we put in another made form consisting of the same size office wire which leads to the binding post at the base of the board, thus completing the circuit. As a ground for our lightning arresters we use two number fourteen wires, twisting them each half around the screw or bolt that is provided on each arrester. A sufficient number of lock nut strips are used to make the connection between the instrument cords and the cables leading to the tables. These we generally place directly under the left hand side of the board, as you face it, for the reason that more of our working wires are on that side. Where all wires in the office are on instruments these strips are placed under the entire length of the board. Leading from these instrument strips to the table we use office cable of just sufficient capacity to take care of the table, placing an eight conductor cable for a quartette table and a twelve conductor cable for a sextette table. It is rarely necessary to leave extra strands in an installation of this kind. The same kind of cable is used for local batteries as for instruments. If the installation is made at a point where we have gravity battery, the battery cables are placed on the front of the battery stand, just above the top of the jars, generally parallel with the bottom of the next shelf above. The cable is fastened by billet leather and just one pair of wires brought out to wood binding posts for each battery. The binding posts are so placed that the wire from a copper will reach them. It is necessary, of course, to run a jumper from the zinc. This arrangement also does away with the necessity for disturbing the cable strands when a change is desired or a battery cleaned. The telegraph tables must necessarily be placed with a view of utilizing, to the best advantage, the space available. This is especially true in rented buildings, where each square foot of space means so much expense. While planning to utilize the space to good advantage, however, the question of light and room for the operators should not be lost sight of. You place the tables for men to work at, they can only do their best work when the conditions are the best. If they can see where their comfort is being looked after they will take the most pains and turn out the best work. This is the plan of wiring and placing of tables followed by us in the first class of offices.

The same plan is followed at the second class of offices as to wiring, but we provide special size tables for the operator whose duty it is to handle train orders and car reports. We find by allowing table space of five feet by two and a half feet (practically what is allowed for an ordinary train sheet) an operator can readily handle the necessary train orders and take car reports if called upon to do so. In the ordinary yard office and country office we do not go to any elaborate system of wiring, but we aim to place all wires in a systematic workmanlike manner, using office cable from the board to the tables and for local batteries. If it is necessary to run single wires from different points to a common point we lace them together firmly, from the point they center, rather than to spread them out in cleats. Instead of curling or "pig-tailing" the wires, either single or from a cable, we leave a very small amount of slack, leaving them straight as possible. In the case of single wires this does away with a mess of curled dirt catchers, and in the case of cable it eliminates the cracked cable strand insulation with which we have all had experience. In offices where there are four or more sets of instruments, up to seven, we place a local spring jack. In offices where there are seven or eight instruments we place a main line spring jack. If there are more than eight sets there is work enough for two men and two jacks or two tables are installed. 8he one man eight wire offices are very few.

I hope some day to see the installation of offices further systemized. Why would it not be a good plan to say the "north" or "east" wire should only go to the front leg of the key, the "south" or "west" wire only to the back binding post of the relay and the back leg of the key should always be connected to the front binding post of the relay? Why would it not be a good plan to say the zinc end of your local battery should always go to the right hand local post of the relay and the copper end of your local battery to the back, or right hand side, of the sounder, with the other post on relay and sounder connected? If all linemen were taught such a system it seems that there would be less occasion for blaming wire trouble to cables. There would also be less time lost in locating office trouble.

Mr. Chenery: The annual convention was advertised for the 19th and 20th, and I think a good many people who came here expected the convention would close after these two days. I think it is a mistake. We should have at least three days. Let us have it understood that we will advertise what we are going to live up to.

Secretary Drew moved that when the convention adjourn it adjourn to meet at Montreal, June 17, 18 and 19, 1908.

Which was seconded.

Mr. Cellar: Wouldn't it be possible to have the meeting a later date, say, the following week?

Mr. Chenery: Good suggestion.

Mr. Cellar: I think some of us would perhaps have difficulty in getting away the 17th of June.

Mr. Ryder: This is the same question that has been brought up before, caused by the fact that the date of our meeting ordinarily comes during school graduation week. But if the next week will answer I would be in favor.

Secretary Drew: I will change my motion to read the 24th, 25th and 26th, with the consent of my second.

The motion was agreed to.

Mr. Rhoads: My recollection is the secretary announced the death of two members. It has been customary in the past and I think it would be well to instruct the secretary to write the families of the deceased the condolence of the association.

Secretary Drew: I have written Mrs. Read. Mr. Mackenzie had not been a member for two years at the time of his death. He was never made an honorary member. For that reason, I said when I announced their death, that no action was necessary.

REPORT OF THE COMMITTEE ON UNIFORMITY.

Presented at the Convention, Atlantic City, June, 1907.

(As read by John L. Davis, Chairman).

At the last meeting of this Association a motion was made as follows: "That a Committee be appointed for the purpose of gathering together a sufficient amount of information to make a full and complete report on the subject of 'The duties of the Superintendent of Telegraph and rules and regulations for the telegraph department,' the committee to obtain an outline of the duties of the different Superintendents of Telegraph and if possible copies of the telegraph department rules in effect on various railroads, to consider first the most important points and submit with their report proposed rules that will cover those points. A copy of the proposed rules to be submitted to each member of this Association for a vote as to whether or not they should be adopted." The motion was duly seconded and carried and a committee was appointed as shown in the proceedings of that meeting, but unfortunately the subject title as shown in the appointment of committee (see book of proceedings, convention 1906) is misleading, and indicates that it is the purpose of this committee to outline the Superintendent's duties, rather than those of the men under him. It was not contemplated by the mover and seconder of the motion to attempt to uniform the duties of the various Superintendents of Telegraph, as that is entirely outside of the province of the Association. It was the desire of the convention that the committee should secure an outline of the duties of the different members of the Association for submission with their report, so that the Association could act intelligently on rules for the telegraph department.' We do not expect to establish complete uniformity, not even in one particular thing, immediately, but we feel that where there is a slight difference in the rules, that the Superintendent of Telegraph can, by his own personal effort, change the rule, or, if he hasn't the authority to change it, he can endeavor to persuade the officer to whom he reports to sanction slight changes, in order to bring about uniformity, where it can be done consistently.

At a meeting held in Chicago on March 14th, 1907, the work that had been done up to that time was gone over carefully and it was decided that further action could not be intelligently taken without obtaining from the different Superintendents of Telegraph an outline of their duties, believing that we should not attempt to outline rules for subordinates over whom our members have no control. A letter was there formulated which we thought could not be misunderstood, and it was addressed to every Superintendent who is a member of this Association, there being 57 in number. The result showed very plainly that the majority of the members misunderstood our purpose, because we received but 33 replies; 24 did not answer, 12 were noncommittal, 8 were unfavorable and 13 were favorable.

It was rather discouraging to find that only 13 of the members of this Association were apparently in favor of assisting us in the work we were appointed to do, after receiving the impression in Denver that it was the unanimous opinion that the work was really considered necessary for the good of all concerned.

In the replies that were received we find that the duties of Superintendents of Telegraph vary widely, and we have found also that there is a wide field for the kind of work we are doing, because the lack of uniformity in rules is plainly visible; but after discussing and fully considering the nature of this work, we are positive that very little good can be accomplished without the entire good will and unanimous support of this Association. The matter is therefore submitted to the convention for any action it may desire to take. Respectfully submitted,

Committee on Uniformity,
W. P. McFARLANE,
F. H. VAN ETTEN,

Mr. Davis: I was asked not long ago to do some little work for the General Managers' Association and I was very much pleased to find while on that work that they are doing more to bring about uniformity in the telegraph departments than the committee appointed by this Association could hope to do. I, therefore, suggest that the committee be discharged and that no further time be taken on that account.

Mr. Ryder moved the report of the committee be accepted and distributed,

Bulletins, Form, and Messages on Hand.

President Griffith: There is one more little report which will only keep you a moment, and that is the report of the committee to confer with the American Railway Association as to state laws. That committee was created to prevent, if possible, power transmission lines from occupying railroad rights-of-way parallel with railroads. It is a known fact a good many of our roads are electrifying their systems. Others contemplate doing so in the near future. In view of this, together with the fact of the attitude of legislators at this time, after consulting officers of various roads and incidentally members of the American Railway Assn., we concluded that if we took the matter up with the legislature it might react. Furthermore, it might suggest to the minds of the legislators to do just what they have done in Arkansas. Your committee, therefore, desires to report progress.

Mr. Ryder moved the report be accepted,

Which was seconded,

And agreed to.

Mr. Ryder: I move that papers to be presented at future meetings be printed and distributed to the members before such meetings.

Secretary Drew: The motion is not seconded but I want to speak on it anyway. Twelve days before this meeting just two papers had been received at my office. Now, I will give any our printing friends a chance to say how much opportunity there was to get these papers printed, get them mailed in time to do anybody any good before the meeting. Four days afterwards two more papers came to my office, and with the two that came to my office was a full page correction on one of the two that had reached me first and a substitute paper for the other of the two that reached me first. That left eight days to send these papers to the printer, get out the proof and for me to go over it, send it back to the printer, have him print it, come back to me to mail and get it to anybody before they came to this convention. Now, you cannot do it. If we are going to have the papers printed there must be a limit as to the time that these papers must be in the secretary's hands. I am well aware of the advantage of having these papers printed and distributed before the meetings, and, there are some disadvantages, but I think the advantages outweigh the disadvantages. I think it would be a good plan.

Mr. Chenery: Mr. Taylor, of the topic committee, is not here, but we had some correspondence as to the advisability of printing these papers in advance, and such members as were requested to prepare papers were, also, requested to have these papers in the hands of the secretary not later than May 15.

Secretary Drew: Not a paper was there on May 15.

Mr. Chenery: Inasmuch as that condition prevailed, it was then decided by the chairman to assign to each paper one or two members to discuss it. I think there are fourteen railway clubs in this country that issue proceedings monthly and I do not think there are two that attempt to publish papers in advance. The St. Louis Railway Club, with which I am indentified, have discussed this matter a number of times. We have the proceedings of the New York Club and the Western Club of Chicago, who issue their paper in advance. I sometimes wonder whether we can expect as much interest in a paper if you know what it is. If you don't know what it is you anticipate something. That is the experience of the railway clubs.

Secretary Drew: That is one of the disadvantages I spoke of. I know that when we have sent out papers to some of our Superintendents and they have seen what was to be read, they have simply staid at home. And the officers of some of these roads have said to them, why you have the document here; study over them; keep at your work. Now, there is that disadvantage that I know of.

Mr. Cellar: I feel that a good deal of the delay to the special papers this year was caused by the fact the assignments were not made until late in March or early in April.

The motion to print the papers, having been seconded,

Was agreed to.

Mr. Ryder moved that no paper be allowed to be presented to the meeting that had not been furnished to the secretary in time to be printed and distributed to the members before the meeting is held.

President Griffith: Of course, we want to get in all the papers we can as early as we can, but if we decline papers presented a week before the convention you may loose some pretty good things.

Mr. Dailey: If the members could only have them when they arrive at the meeting.

Mr. Ryder: That would help some.

Mr. Chenery: Change your motion. (Addressing Mr. Ryder.)

Mr. Ryder: I move that no paper be allowed to be presented at our meetings that has not been furnished to the secretary sufficiently early to enable him to at least have advance copies presented to us on our arrival at the meeting.

Which was seconded.

And agreed to.

REPORT OF COMMITTEE TO PREPARE TRANSFER BLANK.

Mr. Davis presented the following report:

To the President and Members of the Association of Railway Telegraph Superintendents:

At a meeting of the Superintendents of Telegraph held in Chicago, October, 1906, a committee was appointed for the purpose of gathering together a sufficient amount of information from the different railroads to prepare a blank that could be used on any railroad by telegraph operator in transferring train orders, bulletins, forms, messages, and any other unfinished business to the relieving operator.

The committee is composed of two members; but, unfortunately, they are located 840 miles apart, and it has been impossible for this committee to get together and handle this matter as it should like to have done.

Quite a good deal of information was, however, gathered together by correspondence, and a proposed form printed and sent to the different members of this association for approval under date of February 19th, 1907.

Some of the suggestions offered for improvement are as follows:

NICKEL PLATE—Recommends book form with additional space for over due trains.

TERMINAL RR. ASSN. OF ST. LOUIS—Recommends book form with perforated duplicate sheet, so that carbon copy can be made and forwarded to head quarters daily.

SOUTHERN RAILWAY—Calls attention to difference in normal position of train order signals.

UNION PACIFIC—Suggests larger space for number of train orders on hand and recommends an additional space for trains overdue that have not passed.

ILLINOIS CENTRAL—Suggests radical change.

WABASH RAILROAD—Is satisfied with its present blank.

LAKE SHORE—Suggests ink record. One sheet for every twenty-four hours, with foot notes instructing operators to make record of storms, improper working of wires, unsafe condition of track, bridges, etc. The blank to be forwarded to the chief dispatcher daily.

KANSAS CITY SOUTHERN—Satisfied with its present blank.

COTTON BELT—Satisfied with its present blank.

SOUTHERN INDIANA—Suggests radical changes.

C. & A.—Satisfied with its present form.

M. K. & T.—Suggests slight change.

BIG FOUR—Recommends radical change.

MISSOURI PACIFIC—Fairly well satisfied with blank now in use, but would like to see something better, if possible.

SEABOARD AIR LINE—Satisfied with its present form.

C. & E. I.—Recommends radical change. The general manager of the C. & E. I. Railroad is awaiting the action of this convention before adopting any blank now in existence.

GRAND TRUNK—Suggests radical change. Recommends that the matter be introduced at this convention for the purpose of discussion with a view of arriving at a standard form applicable to any railroad.

Your committee has found that there is a very wide difference of opinion on this subject, and consequently got together on June 11th, 1907, and formulated a blank which it is thought will cover every objection so far offered.

Your committee thinks also that there is no good reason why uniformity cannot be established in this matter because it is within the province of the Superintendent of Telegraph to make his recommendation on this subject; each member can take up individually with his superior officer the question of adopting the form we decide upon if he feels so disposed. Recommendations made on this subject to be considered as suggestions only, with a view of strengthening what we believe to be a very weak point.

Considering the present agitation against railroads throughout the country, your committee feels that every precaution should be taken with a view of placing the responsibility where it belongs in case of accident; and considers the necessity for a satisfactory transfer blank very urgent.

Respectfully submitted,

W. W. ASHALD, Chairman,
JOHN L. DAVIS,
Committee on Operators' Transfer Blank.

A. B. & C. R .R.

TELEGRAPH OPERATORS' TRANSFER.

................Station.............190.. Time......M.

Condition of Train Order Signal..........................

Position of Train Order Signal...........................

Order No....Addressed to.......

Order No....Addressed to.......

Train Orders on Hand Order No....Addressed to.......

Order No....Addressed to.......

Order No....Addressed to.......

Bulletins, Form, and Messages on Hand.

....

....

....

Switchboard or Wire Changes, from Normal **Conditions.**

....

All overdue trains have passed except....................

Remarks:

....

....

......................Retiring **Operator.**

......................Relieving **Operator.**

The above Record must be made in ink.

(Such other footnotes as may be desired.)

Mr. Davis: As I said yesterday, our general manager called on me some months ago for something of this kind. I hoped Mr. Ashald would be here today, because he has some very splendid reasons to offer for having a blank of this kind in use and having uniformity. I would like some action taken so I can say to our general manager this form is approved or disapproved by this association.

Mr. Walstrum: I see no mention made of transfer of Western Union accounts. I think that is an important matter. I have a good deal of trouble and I think some provision should be made for transferring commercial accounts.

Mr. Davis: The object of this blank is to protect ourselves in cases where an operator fails to transfer some very important railroad matter to the relieving operator. We have cases where an operator has failed to deliver an order. You have a question of veracity between the two men and it is hard to determine which is wrong. That is what the committee had in mind.

Mr. Chenery: I understood the committee was appointed to just take care of operator's transfers. I move the report of the committee be accepted and that this association endorse the form of transfer submitted.

Which was seconded.

Mr. Van Akin: Is this blank to remain in the office or is the operator who goes off to take it with him as a receipt. What is to be done with a blank of this kind?

Mr. Davis: We received some very splendid suggestions as to how this record should be kept. There are things we might talk on for two hours, but we have eliminated everything that we thought could bring about a difference of opinion and submitted for approval only the portions that we thought could be safely approved by every member.

Mr. Chenery: The method of handling the blank would be a matter of detail for each separate road.

The motion to adopt report and form of blank,

Was agreed to.

Mr. Dailey: I move a rising vote of thanks be extended to Mr. Chenery for his untiring efforts as president of this association.

Which was seconded.

President Griffith: As that needs no discussion and everybody feels the same way, I will put the question.

The motion was unanimously agreed to by a rising vote.

Mr. Chenery: I simply thank you. I want to say to you it is an honor to belong to this association. I get more information in coming to this convention than the meeting of any other body. When I first attended the meetings, some sixteen years ago, I got back in the corner and listened, and listened for several years, until I felt I had enough force back of me to get up and do something. If I have done enough to merit the good will expressed here I am certainly gratified. (Applause.)

Mr. Chenery: I move that this association extend a vote of thanks to the telephone companies, the telegraph companies, representatives of the wireless telegraph company, and such other people as have extended courtesies to us during the convention, including the Pullman Company,

Which was seconded,

And agreed to.

Mr. Rhoads moved the convention adjourn,

Which was seconded,

And agreed to.

P. W. DREW,
Secretary.

EXHIBITS AND EXHIBITORS.

The National Telegraphone Company, of Rochester, N. Y., had on exhibition samples of three standard wall and desk type composite sets and portable composite set for the use of repairmen. These instruments are equipped with devices to eliminate the noise usually present and to insure perfect telephonic communication over working telegraph wires with no interference to either. The exhibit was in charge of Mr. Jay G. Mitchell, engineer. Mr. G. E. Milligan, the president of the National Telegraphone Company, was also present.

The North Electric Company, of Cleveland, O., had on exhibition a fifty-line magneto switch-board equipped with forty locking signals and ten standard drops. This visual signal is said to possess many advantages over the usual form of manually restored or mechanically restored drop. In operation the operator's view of the signals is not obscured by existing connections as the jacks and signals are not mounted together as in all forms of mechanical self-restoring drops. The signal is operated by ringing current from the subscribers' telephone in the same manner as the standard form of drop, but when once actuated it locks into the exposed position displaying horizontal white bars and remains in that condition until restored by the insertion of the plug by the operator when it is restored to a normal condition. A standard five-bar bridging compact type wall telephone, standard five-bar bridging desk telephone, lineman's test set, ten and twenty-line non frame switchboards for small exchanges and samples of standard parts of equipment, were also shown. The exhibit was in charge of Mr. Jay G. Mitchell, engineer of the company.

A very interesting and novel working exhibit of lightning arresters was made by Mr. E. W. Vogel of the Railroad Supply Company, Chicago. Mr. Vogel exhibited several of this company's style 812 arresters, connected up with relays and batteries, formed a closed circuit. High static discharges were allowed to enter the lines and the lightning arresters showed this high voltage current going to "ground," rather than enter the relays. The current used in this demonstration was about 25,000 volts, and the current used on the relays was that of three dry batteries; the lightning arresters took the high voltage discharges very successfully and without interfering with the operation of the relays or the currents supplying same. Mr. Vogel stated that probably 50,000 of these arresters have been in use during the last two years, and that so far as he knows no telegraph or signal instruments have been injured or burned out on any circuit where these arresters have been in use.

The Sandwich Electric Company, of Sandwich, Ill., was represented by Mr. H. O. Hugh, E. C. Hennis and Louis Casper. Their exhibit consisted of an improved system in telegraphy, in addition to the various types of their well known telegraphone. The new telegraph arrangement was set up for operation in a manner that showed clearly the method of operation and the practicability of the system. The chief function of the system is obtaining an additional Morse circuit from a way wire. Any number of intermediate way stations may be operated on this system; at the same time a through circuit between the terminals may be derived. There is no artificial line or other complications inherent to duplex systems. The telegraphone was shown to operate upon this circuit simultaneously. This system is a radical departure from the ordinary telegraph system and considerable interest was manifested in the same by the visiting superintendents. Detailed information will be gladly furnished to interested parties regarding this apparatus which is designated as the "Rughplex," when such parties have requirements for additional telegraph facilities without the necessity of stringing more circuits. This device has been tried in practical operation and extremely satisfactory results were obtained.

The Western Electric Company, of Chicago and New York, exhibited a line of telephone and telegraph apparatus. The apparatus used for compositing telegraph lines consisting of wall and portable station sets and the necessary condensers, resistances and terminel differentiators for the equipment of intermediate and terminel telegraph stations were on view. A full line of standard Western Union type telegraph apparatus, simple and quadruplex circuits, was also displayed. The company was represented by W. E. Harkness.

The United States Electric Company, with office at 95 William Street, New York City, gave a very complete exhibition of the Gill Selector device showing its application in actual operation. This device by its combination worked on the regular telegraph circuit, throws into the circuit a continuous ringing bell, thereby notifying the operator that he is wanted on that circuit. The device is called a selector because any number of instruments can be placed on the circuit, each having a numerical combination of its own, and by the working of its particular combination on the Morse key at the calling office, any office on the circuit may be called and the bell will ring continuously in that and in no other office on the circuit. In connection with the selector, Mr. Gill has perfected an "answer-back." This ingenious little arrangement repeats back to the calling office the number of the office called, at the same time throwing into circuit a continuous ringing bell. The calling office knows to a certainty that its signal has been received and that the bell is ringing. Models of the semaphore device were also shown. This arrangement enables the despatcher to throw a semaphore, at any place where a semaphore is installed. The semaphores are equipped with the "answer-back," repeating back to the sending office the number of the semaphore under operation and thus insuring the operator of the fact of its proper execution: All of these devices operate on the already existing telegraph line.

These selective calling devices are of great economic value, and especialy useful in connection with the operating departments of railroads in various forms of application. By the use of the Gill Selector the following are a few of the advantages insured: First, a great saving in time of employees now used in calling operator; second, a great increase in the capacity of the wire for doing business due to saving of time now used in calling operator; third, for the train despatcher a most sure and speedy transmission of train orders and a minimum of lay-outs; fourth, this device provides a means for calling an operator in an emergency, at night or when he is off duty, when a wreck or accident is imminent, for a bell can be placed in his room at his home and by its ringing the necessity of his immediate presence at his instrument will be made known to him. The representatives, at the Atlantic City Convention, were Mr. Edwin R. Gill, the inventor; Mr. Howard E .Merrell, general manager; Mr. Harrison Osborne, secretary, and Mr. W. H. Merrell, installation chief.

Mr. Richard D. Brixey, of New York, a son of W. R. Brixey, the well-known manufacturer of aerial, underground and submarine cables, and of the famous "Kerite" tape, was an interested attendant at the convention. He was elected an associate member of the association and says that in future he will attend "all the shows." He has an affable manner, made acquaintances readily and appeared to be exceedingly well received by all the delegates present.

Mr. John J. Ghegan, of New York, president and general manager of J. H. Bunnell and Company, Inc., than which there is no better or more favorably known manufacturing concern of telegraphic supplies, was also among those present. He had a hand shake for all, for no man has a wider acquaintance among the fraternity than he, and the opportunity afforded by the convention was an excellent one for a cordial renewal of "friendly relations." He did not forget to bring along with him a little memento for each of the members. This consisted of a decidedly natty little "wallet" of pigskin, each being stamped with the name of the recipient. Of course the wives and daughters of the members were equally well remembered, only that the pocketbooks for the ladies were different in design and the names omitted, more in keeping with feminine requirements and dignity. Mrs. and Miss Ghegan accompanied Mr. Ghegan.

Mr. A. P. Eckert, of the Safety Insulated Wire and Cable Company, an associate member, was also present with his wife. Mr. Eckert is always an interested attendant at these yearly conventions, no matter where held.

Mr. John Langan, who represented the Okonite Company of New York, whose wires and tapes, Okonite and Mansen, and Candee weatherproof wires, are recognized as standard products, was inducted into associate membership and received a fine reception from those present.

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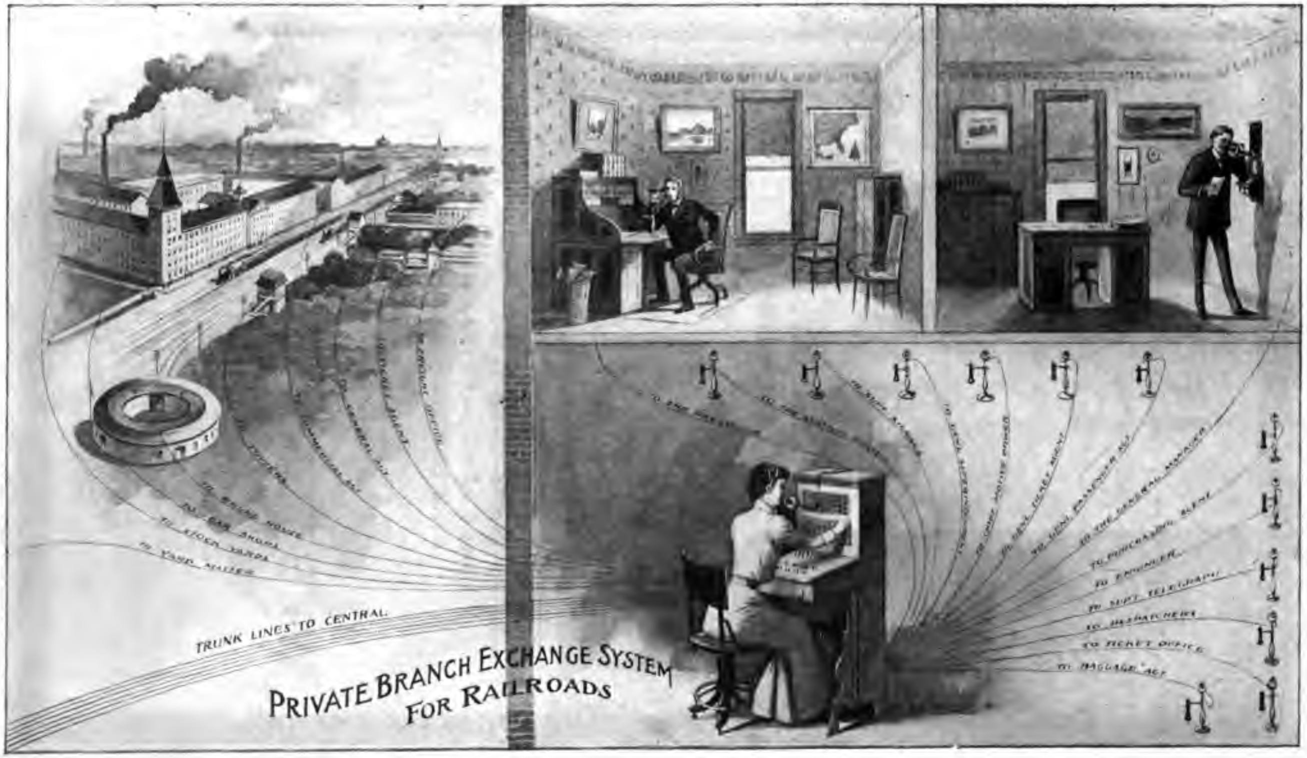
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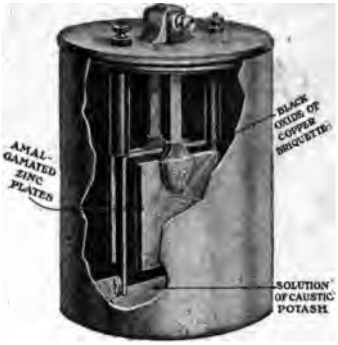

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